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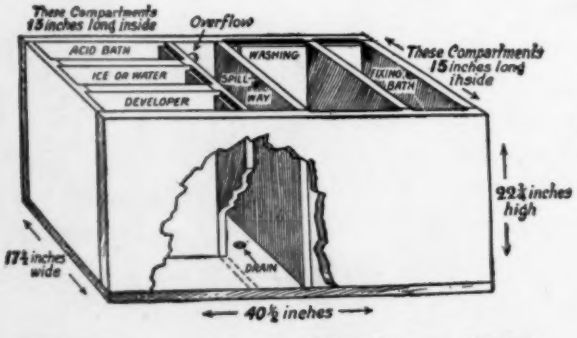

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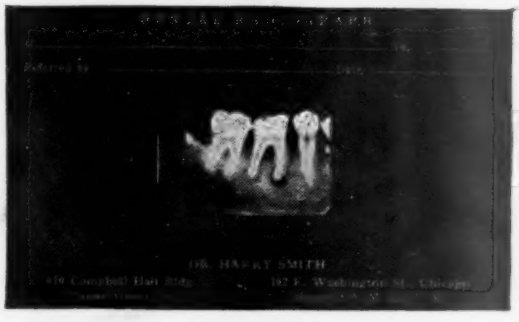

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THE USE OF BURIED EMANATION IN THE TREATMENT OF MALIGNANT TUMORS*

By HENRY H. JANEWAY, M.D.

Attending Surgeon to the Memorial Hospital and Chief of its Radium Department

NEW YORK CITY

AT the last meeting of this society, nearly a year ago in Atlantic City, I presented a paper (recently published in THE AMERICAN JOURNAL OF ROENTGENOLOGY) on the advantages of buried emanation in the treatment of many types of cancer, with a report of illustrative cases. A year's additional experience has better defined the indications for burying emanation, has more accurately standardized the dosage, and has enhanced the value of the results by increasing the duration of the post-therapeutic period in many patients. Our conclusions upon the advantages of this method have been confirmed.

INDICATIONS FOR THE USE OF BURIED EMANATION

Mouth. It should be used:

(1) In combination with surface treatment in cancers of the lip when there is deep infiltration of the substance of the lip.

(2) In cancers of the interior of the mouth not limited to the alveolar processes, with the exception of the superior alveolar process in those originating in or involving by direct extension the maxillary sinus.

(3) In practically all carcinomas of the tongue and floor of the mouth.

(4) In cancer of the tonsil and adjacent structures.

Rectum. (1) As a reinforcement to the treatment by tubes in annular growths, and (2) alone in growths limited to one segment of the rectal wall.

Cervix Uteri. In carcinoma of the cervix, buried emanation is reinforced by the chain of tubes placed in the utero-cervical canal. The words "reinforced by" express the fact exactly, since in cervical carcinoma buried emanation is the most important part of the treatment.

Prostate and Bladder. The emanation tubes are buried in the prostate through the perineum, or when accuracy requires, may be introduced safely through the anterior wall of the rectum.

Breast. Buried emanation may be used in non-ulcerated carcinomas of the breast when it is desired to avoid surgical removal.

Lymphatic Glands. In primary or metastatic tumors of the lymphatic glands which form spherical masses, more especially those adherent to surrounding tissue but not in too intimate relation to important nerve trunks.

Sarcoma. Bulky spherical or fusiform sarcomas of the extremities may be treated with buried emanation.

*Read by title at the Fifth Annual Meeting of THE AMERICAN RADIUM SOCIETY, New Orleans, La., April 26, 1920.

The chief advantages of embedded emanation for the growths of the mucous membranes above mentioned are the accuracy of the primary application, the economy in the use of radium, and the ease with which residual incompletely treated remnants of the tumor left after the initial treatment may be destroyed by embedding emanations in these remnants as soon as they are identified. Often one such supplementary treatment of the tumor process is sufficient to dispose of a growth from which otherwise a fatal recurrence would take place. The most important detail in the successful treatment of these growths is the correct interpretation of the changes in the post-therapeutic period.

Dosage. It is difficult to formulate rules for dosage, and such rules are always subject to modifications imposed by the special conditions present in any case.

The volume of the tumor is the most important factor in determining the dose, but the shape of the growth is of almost equal importance, and influences the dosage hand in hand with the volume. An elongated superficial growth will, for instance, require almost the same dose as a circular superficial growth with a diameter equalling little less than the long axis of the elongated tumor.

A flattened tumor with little deep infiltration requires approximately the same dose as a spherical tumor with a diameter equalling the long diameter of the flattened growth. Between these variously shaped tumors there is a great difference in cubical volume, but the difference in the number of milli-curies required by them is not proportional to this difference but rather to the difference in the number of square centimeters in the plane of the tumor's largest diameter.

For these reasons the diameters of tumors are the most practical guides to the doses required by them.

The following table illustrates approximately the dosage of buried emanation which we are using at the Memorial Hospital for epidermoid carcinoma, many spherical breast tumors, and sarcomas.

In using the dosage of this table it must be remembered that an important difference exists in the radiation which the tissues receive when exposed for equal periods to embedded emanations and radium elements, the former in undergoing continuous decay and

FOR CIRCULAR AND APPROXIMATELY OVAL TUMORS OF THE SAME LONG DIAMETER:

Diameter	*Deep Infiltration*	*Surface Area*	*Dosage*
1 cm.		.77 sq. cm.	5 mc.
1½ cm.		1.7 sq. cm.	8 mc.
2 cm.		3.14 sq. cm.	10 mc.
2½ cm.	Not more than 1½ cm.	4.8 sq. cm.	15 mc.
3 cm.	Between 1 and 2 cm.	6.5 sq. cm.	17.5 mc.
4 cm.	Between 1 and 2 cm.	12.5 sq. cm.	20. mc.
5 cm.	Between 1 and 2½ cm.	19.3 sq. cm.	22.5 mc.
6 cm.	Between 1 and 3 cm.	28.27 sq. cm.	25 mc.

For spherical tumors there is little difference:

Diameter	*Area of plane of diameter*	*Number cubic cm.*	*Dosage*
1 cm.	.77 sq. cm.	.52 cb. cm.	5 mc.
1½ cm.	7.7 sq. cm.	1.70 cb. cm.	8 mc.
2 cm.	3.14 sq. cm.	4.18 cb. cm.	10 mc.
2½ cm.	7.8 sq. cm.	8.19 cb. cm.	15 mc.
3 cm.	6.5 sq. cm.	14.08 cb. cm.	20 mc.
4 cm.	12.5 sq. cm.	33.44 cb. cm.	22 mc.
5 cm.	19.3 sq. cm.	65.29 cb. cm.	25 mc.
6 cm.	28.27 sq. cm.	112.86 cb. cm.	30 mc.
7 cm.	38.48 sq. cm.	180.03 cb. cm.	35 mc.
8 cm.	50.26 sq. cm.	251.52 cb. cm.	40 mc.

the latter remaining of constant strength.

Results. In considering the results, a brief note will first be made on the fate of the eleven cases reported at length last year. Of these eleven, two have died—one, a man of seventy-three, in whom a complete retrogression of an advanced carcinoma of the tongue was obtained, died of diabetes. Up to the time of death there was no demonstrable recurrence of his carcinoma. The other, a man of sixty, with very advanced carcinoma of the nasopharynx with bilateral cervical metastases, in whom great retrogression and relief had been obtained, developed a local recurrence in the left nasal cavity, and later a small enlargement of freshly involved cervical lymph nodes. Ten days before his death the recurrence in the nose seemed under fair control. The remaining nine patients are still well and free from evidence of malignancy, and another year can be added to their post-therapeutic course.

To these cases many additional ones of similar character have been added during the past year, which will be published in detail later.

A TRAVELLING FOREIGN BODY

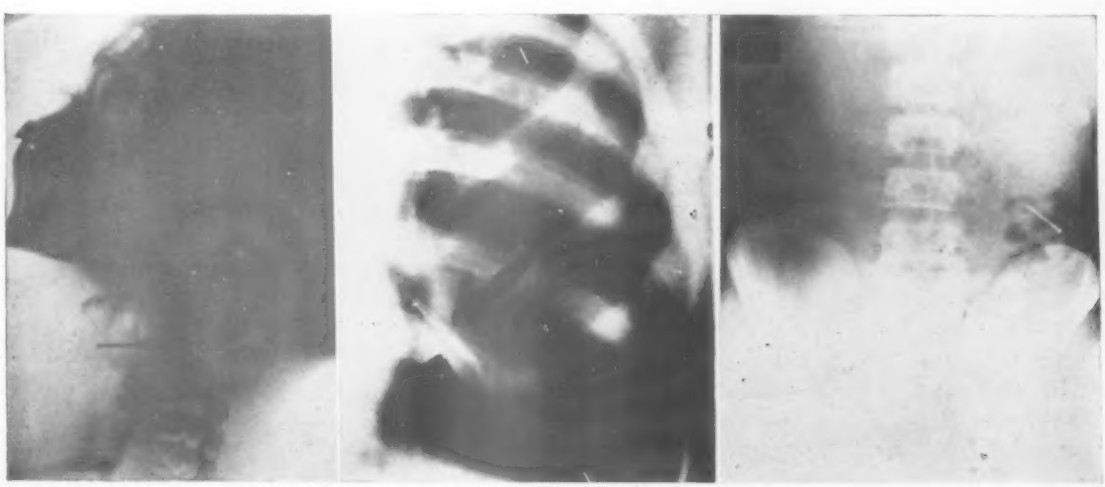
By E. C. KOENIG, M.D.

Buffalo General Hospital

BUFFALO, N. Y.

THIS is the case of a child who accidentally swallowed a pin which lodged in the upper part of the esophagus. The position of the pin was located, the child taken to the hospital and anesthetized, but no pin was to be found with the esophagoscope. *X*-ray again located the pin, this time in the right bronchus. The surgeon debated that night whether or not to remove the pin from the bronchus and decided to wait until morning. In the morning the child was perfectly comfortable with no distress. I made another plate the following day and found that the pin was no longer in the chest. From the position on the plate I considered it must have been outside the stomach, and found it down in the region of the cecum. The child had coughed the pin up and swallowed it and within forty-eight hours he passed it through his normal channels.

We have then in this case a child, first, with a pin lodged in the upper part of his esophagus; the pin becoming dislodged, slipped by the epiglottis, through the larynx and down the trachea to the right bronchus. Later the pin was coughed up, swallowed, transmitted along the alimentary tract and finally expelled from the rectum.



THE TREATMENT OF RECURRENCES AND METASTASES FROM CARCINOMA OF THE BREAST BY MEANS OF RADIUM AND ROENTGEN RAYS*

By GEORGE E. PFAHLER, M.D.

PHILADELPHIA, PA.

BOTH radium and the roentgen rays have proven themselves of undoubted value in the treatment of malignant disease. Every physician who has mastered a good technique, who has used skill and good judgment in the treatment of malignant disease, has seen some brilliant results produced by either agent. He has also seen many failures by either agent, and in some instances failure has taken place in cases in which success seemed certain. Therefore, it is much better if we learn to combine these agents and use one to reinforce the other so that we may affect more patients favorably than is possible by either agent used alone. Undoubtedly more patients recover from malignant disease to-day than ever before, while many others that are hopeless are made more comfortable and their lives are prolonged. Still we must admit that malignant disease is on the increase, and therefore it is clearly our duty as physicians to utilize every means at our command to combat it. With the many agencies and brilliant minds now at work in searching for the cause of malignant disease, we may sooner or later find it. While the true cause of malignant disease has not yet been determined, we do know that many pre-cancerous conditions, such as warts, moles, chronic fissures, chronic ulcerations, and benign tumor formations ultimately become malignant, and we also know that in the non-malignant stage all these conditions can be cured, many of them by destruction by means of electro-coagulation, carbon dioxide snow, excision, or by the local application of radium or the roentgen rays; and if all such lesions are treated early, and if every physician and patient is on the alert to eliminate the so-called simple conditions, we shall have made great steps in advance in the treatment of malignant disease.

One of the most discouraging experiences that every physician has is the discovery of a recurrence or metastatic nodule following amputation of the breast for carcinoma. Recurrences and metastases may develop early after the operation, but generally it is after several months, and even as long as eighteen years after the patient has considered herself perfectly well. Many of these recurrent nodules and metastases are in locations where they cannot be practically removed by surgical means. In fact, I question the advisability of an attempt at removal, for if the original operation, which was clean and done at a time when operation was much more favorable, failed in that stage, how can we hope for success in these later stages? Therefore, we must acknowledge that when these recurrences and metastases develop, our only real hope for their control is by means of radiation. The two agents at our command are radium and the roentgen rays. The greatest amount of skill and thoroughness is necessary if success is to be obtained, and in many instances failure will result even then.

The Place for Radium in Malignant Disease of the Breast.—It has been my observation from the use of these two agents, that radium will produce a greater local effect in proportion to the amount of surface irritation as compared with the roentgen rays. I have also noticed that radium will produce a more pronounced effect upon localized nodules than the roentgen rays, but that the roentgen rays are more useful for their general and wider distribution and for the treatment of deeper lesions, which can be reached

*Read at the Fifth Annual Meeting of THE AMERICAN RADIUM SOCIETY, New Orleans, La., April 26, 1920.

by skillful cross-firing effect. Therefore, in the treatment of localized nodules in line with the incision, or of those localized in the axilla or in the supraclavicular region, I make use of radium because the radium can be brought into immediate contact with these nodules, and they can be made to soften and disappear. There is another distinct advantage in the treatment of the nodules located in the axilla by means of radium, because one can place it deep into the axilla much more conveniently than the roentgen rays can be applied. I have seen nodules the size of my thumb disappear within a month from the beginning of the application of radium. The radium must be applied with skill and due consideration must be given to the amount of radium, the amount of filtration, the distance from the parts to be affected, and the time of the treatment. I believe it has not yet been proven whether massive dose treatment by radium or fractional doses will prove the most desirable, but it is the general impression that the massive dose treatment would produce the most satisfactory results and can be applied with more skill. A report on any particular case in which radium has been applied and in which only the amount of radium is mentioned, or even the duration of application, means little or nothing, for we know very well that the effect varies with the square of the distance at which it is applied, and that the effect is modified very much by the amount of filtration. Variations in the application must be made according to the conditions in any given case, and these patients can no more be treated by rule than pneumonia patients or appendicitis can be treated by any fixed operation.

In each instance one must consider the rate of growth, the number of nodules, the general tendency towards recurrence, and in every instance a careful roentgen examination of the chest must be made, for it is my observation that about 50 per cent of the patients who come to me for postoperative treatment for carcinoma of the breast, have already mediastinal and pulmonary involvement. This high percentage of mediastinal involvement is likely due to the fact that in the majority of instances only advanced cases of carcinoma, which have been operated upon, are sent for postoperative treatment. It is my opinion that all cases should be sent for postoperative treatment, and I believe that a distinct advantage will be gained if anti-operative treatment is given by means of the roentgen rays. In a very general plan of treatment, which can at no time be followed blindly, for the treatment of these nodules, I would make use of radium filtered through ½ mm. of silver, 1 mm. of brass, 3 mm. of pure rubber and about 2 cm. of gauze or felt. The duration of the application will depend upon the amount and concentration of the radium used. In general, 100 mg. distributed over an area 4 x 8 cm., so as to produce as nearly as possible homogeneous rays, can be left in place twenty-four hours. Fifty milligrams can be left in place for twenty-four hours in the supraclavicular region. Fifty milligrams divided into two portions can be left in place in the axilla for twenty-four hours with like filtration.

Radium Effect. Within a week there will usually be some redness of the skin and within two weeks there is often desquamation of the surface of the skin. This always heals easily and at the end of two weeks there is usually a distinct reduction in the size of the nodule. If the nodules have appeared quickly, and are of short duration they disappear usually more rapidly. At the end of a month the redness of the skin will usually have disappeared, and if the nodule has not disappeared the treatment should be repeated. If they have disappeared I believe it is practical to wait two weeks longer and then repeat the treatment with the idea of getting rid of all of the local disease; or it may be well to give half a dose at the end of a month and another half dose two weeks later. I am not sure which of these procedures is best. In all instances, these recurrent nodules mean almost certainly that there are extensions of the disease elsewhere, and

these extensions may be in any direction, but are generally towards the mediastinum. Therefore, the greatest attention must be given to this distribution by means of the roentgen rays. In certain cases in which the nodules do not disappear completely or satisfactorily as a result of the surface application of radium as above described, a greater success can be obtained by means of the introduction of radium needles direct into the nodules and around about the nodules.

The Effects from the Use of the Roentgen Rays in the Treatment of Recurrence and Metastases. All of us have seen many recurrent and metastatic nodules disappear under roentgen radiation. Therefore, when radium is not at hand the roentgen rays should be used vigorously over the entire glandular and operative area, and in many instances complete and permanent disappearance of the nodules will take place. In other instances they will be reduced in size and will become isolated by fibrous encapsulation, and the patient's life will be considerably prolonged and rendered more comfortable; but in all instances, even when radium is at hand for direct application upon the recurrent nodules and metastases, the roentgen rays should be applied in all other areas likely to be involved. Therefore, the entire operative area and the entire glandular distribution from this area should be thoroughly treated by means of the roentgen rays with as much cross-firing as possible to the limit of toleration of the skin. The roentgen rays should especially be directed towards the mediastinum and pulmonary areas. More benefit may be derived from the treatment of the mediastinum by means of the roentgen rays than from radium, because we have an unlimited quantity of radiation at hand. We can place the source of the rays at a sufficient distance so that the difference between the skin and the deep effect will be minimized.

The advantages of the roentgen rays over radium for the general treatment of the chest following carcinoma of the breast are:

1. *Unlimited quantity of radiation.* The roentgen rays have less power of penetration than radium; but since the effects depend upon absorption this lesser penetration may not be a disadvantage. That the roentgen rays, even when produced by 50,000 volts, will penetrate all parts of the chest, is proven by every roentgenogram made of the chest; and when produced by 90,000 volts, such as is commonly used in deep roentgentherapy, we may expect certainly very much more thorough penetration.

2. *The roentgen rays can be comparatively easily distributed* over the entire operative field, including the lymphatic drainage from this area.

3. *The roentgen rays can be directed* into the mediastinum from many portals of entry, and in each instance the experienced roentgenologist can send these rays exactly into the diseased area. When necessary, the roentgen rays can be made to pass as accurately as a bullet or a knife in avoiding structures which are not to be rayed.

4. The source of the rays can be placed at *sufficient distance* from the skin so as to minimize the difference between the skin effect and the deep effect, which gives a great advantage over radium. I will illustrate the application of this principle as applied to the treatment of mediastinal disease and it will apply equally well in any deep-seated disease which must be reached by surface radiation.

The shortest distance to the mediastinum is through the sternum in an antero-posterior direction, and is approximately 2 cm. The deeper portions of the mediastinum in this same direction will be approximately 10 cm. from the surface. The distance from the lateral wall of the chest will be approximately 20 cm. from the axillary line in the average case. Therefore, in treating malignant disease in the mediastinum we must count on a skin-depth distance of from 2 to 20 cm.

In general *radium* is applied at a skin-surface distance of 2 cm. The intensity of radiation from a point decreases with the square of the distance. Therefore, at the

skin-surface the intensity will be $\frac{1}{2^2} = \frac{1}{4}$ or 25 per cent as compared with a distance of 1 cm. The intensity (ignoring absorption for the present) at a skin-depth distance of 2 cm. will be (2 cm + 2 cm.) $= \frac{1}{4^2} = \frac{1}{16}$ or .0625, or 25 per cent of the skin dose can be given at a depth of 2 cm. In other words, one would with radium be compelled to give 4 erythema doses over the sternum to get the effect of one erythema dose at a depth of 2 cm. This intensity of 25 per cent of the skin dose would only reach the nearest point of the diseased area in the mediastinum, and to reach the deeper portions of the disease in the mediastinum one would have to produce an effect at a skin-depth of 10 cm.

The intensity of radiation applied from a point-surface distance of 2 cm. to a skin depth distance of 10 cm. would equal (2 cm. + 10 cm.) $= \frac{1}{12^2}$ cm. $= \frac{1}{144}$. The intensity at 10 cm. skin-depth is therefore $\frac{1}{144}$ as compared with ¼ at the skin surface, or approximately 2.8 per cent of the skin dose. In other words, one would have to give approximately 36 erythema doses with radium at a distance of 2 cm. over the sternum to produce 1 erythema dose at a depth of 10 cm. in the mediastinum.

Let us now compare the corresponding roentgen ray technique. To affect the mediastinal tissues one would choose a focal-skin distance of 25 cm. The intensity of radiation at the skin as compared with 1 cm. would be $\frac{1}{25^2} = \frac{1}{625}$. The intensity at a skin depth of 2 cm. would be (25 cm. + 2 cm. = 27 cm.) $= \frac{1}{27^2} = \frac{1}{729}$ of the intensity at 1 cm. We are of course limited by the skin effect or erythema dose, but when these intensities of $\frac{1}{729}$ at 2 cm. skin depth and $\frac{1}{625}$ at the skin are compared we find that approximately 86 per cent of roentgen rays reaching the surface will reach a depth of 2 cm. while only 25 per cent of the skin dose in the case of radium reaches 2 cm. in depth.

Now the intensity of the roentgen rays at a skin-depth distance of 10 cm. is (25 cm. + 10 cm) $= \frac{1}{35^2} = \frac{1}{1225}$. Therefore, $\frac{1}{1225}$ of the rays reach a depth of 10 cm. as compared with $\frac{1}{625}$ reaching the surface, or approximately 51 per cent. In the case of radium we found the intensity at 10 cm. skin-depth to be $\frac{1}{144}$ as compared with ¼ or approximately 2.8 per cent. Eighteen times as great a proportion of the skin dose from the roentgen rays reaches a depth of 10 cm. as compared with radium.

When treating through the axilla with the roentgen rays at a focal-skin distance of 25 cm. and a skin-depth distance of 20 cm. we get an intensity of (25 + 20) $= \frac{1}{45^2} = \frac{1}{2025}$ as compared with the skin intensity of $\frac{1}{625}$ or approximately 30 per cent. In the case of radium the intensity at the point-surface distance is ¼ and at the skin-depth distance of 20 cm. (2 + 20) $= 22^2 = \frac{1}{484}$, or approximately 8 per cent. Practically a negligible quantity of the radiation from radium applied in the axilla reaches the mediastinum, while 30 per cent of the roentgen rays reach this depth.

The second factor governing the amount of radiation reaching a deep point is the tissue absorption. According to Rutherford (quoted by Boggs and Viol, "Conditions for the Production of Deep Therapeutic Effects with Hard *X*-Rays and Gamma Rays." Read before the Eastern Section of THE AMERICAN ROENTGEN RAY SOCIETY, Jan. 29, 1920), the hard *x*-rays will be half absorbed in 4.9 cm. of tissue, and the gamma rays will be one-half absorbed in 26.5 cm. of

tissue. Therefore, approximately 75 per cent of the hard *x*-rays would be absorbed in the 10 cm. of tissue when applied through the sternum, and only 25 per cent (based on absorption) would reach the deepest point at a skin-depth of 10 cm., but since the law of intensity allows 51 per cent to reach this point we have as the actual amount reaching the deeper point considering both absorption and divergence 25 per cent of 51 per cent or 12¾ per cent of the total quantity reaching the surface. Therefore, if the x-rays are applied through eight portals of entry at a distance of 25 cm. directed toward a certain point 10 cm. deep, an erythema dose is produced at this deep point.

In the case of radium under the law of absorption approximately 7 per cent of the gamma rays will be absorbed in the 10 cm. of tissue, leaving on the basis of absorption approximately 93 per cent of the gamma rays to reach this depth; but on the basis of divergence of the gamma radiation only 2.8 per cent of the surface radiation reaches a point 10 cm. in depth. Therefore 93 per cent of 2.8 per cent = 2.6 per cent of the surface dose or the actual amount of gamma radiation reaches 10 cm. i ndepth as compared with 12¾ per cent of the surface dose in the case of the *x*-rays. In other words, by these calculations nearly 5 times as great a proportion of the surface radiation reaches 10 cm. in depth as in the case of radium.

In practical work one cannot get a cross-firing effect through eight portals of entry through the sternum; but the chest offers especial advantages for cross-firing from all directions, and since the distance is greater when treating through the lateral walls it is my practice to use all surfaces and divide them into a total of from eight to twenty portals. By this process I have produced definite results.

One of my best results is that obtained in a woman referred to me by the late Dr. Wm. L. Rodman, in 1911. He had removed one breast in 1910 for sarcoma, and the second breast in 1911 for carcinoma. She was referred to me for treatment of a mediastinal tumor as large as a man's fist. Under treatment this tumor reduced in size, the remainder partially calcified, and her general health to-day is good, permitting her to attend to her household duties nearly ten years after the removal of both breasts followed by mediastinal metastasis.

The ideal management of a case of carcinoma of the breast consists in a preliminary course of *x*-ray treatment covering the tumor and the lymphatics leading therefrom; then within a week, if circumstances permit, to remove the breast and all tumor tissue thoroughly. Postoperative *x*-ray treatment should then be given over the wound and the lymphatics in about four weeks from the anti-operative treatment. This should be repeated at intervals of a month or more for five or six times. If recurrent nodules develop in spite of this treatment, or in the absence of this postoperative *x*-ray treatment, then radium should be skillfully applied to such nodules, and the general areas and mediastinum should be thoroughly treated by the roentgen rays. Radium and the roentgen rays should never be applied through the same area of skin within a period of four weeks providing either has been used to the degree of an erythema dose.

CONCLUSIONS

1. Radium is our most useful agent in the treatment of palpable recurrent or metastatic nodules from carcinoma of the breast.

2. The roentgen rays is our most efficient agent in the general treatment of the carcinomatous area and the mediastinal and pulmonary disease.

3. Either or both agents must be applied with skill and with a knowledge of the principles which govern their action.

4. With skill and thorough radiation life can be prolonged, the patient can be made more comfortable, and in some instances the patient may be expected to recover.

DISCUSSION OF DRS. JANEWAY'S AND PFAHLER'S ARTICLES

DR. R. E. LOUCKS, Detroit. In attempting to discuss the valuable papers of this symposium I am reminded of the old saying, "It is easier to be critical than correct"; but I want to offer a little word of warning.

Many scientific suggestions have been brought out that are based on physical and clinical experience. What I wish to emphasize particularly is the fact that we as medical men are apt to follow the other fellow and lose our individual observation of the case in view, and be content to do as he has outlined in some paper or clinic.

If you are content to take the path worn smooth by others who have preceded, you will always remain a follower without initiative. How often have we been content to treat a case according to some authority and be satisfied that the best has been done? I ask this question to arouse you to the fact that no two individuals are alike either in health or disease.

The old-time surgeon was content to remove the appendix for symptoms of appendicitis through a one-inch incision, while to-day the pathology is removed and he carefully scrutinizes all the organs of the abdomen and pelvis for any other condition that might cause the trouble or influence the recovery. So it should be with every one in any line of treatment. The best is only good when it comes to the treatment of the many human ills.

The great factors in therapeutic indications are the etiology of the disease, principle of immunity, treatment of the pathology and the close scrutiny of other underlying conditions that influence the recovery. Omit one and you commit the sin of omission.

Volumes are written on etiology and pathology. Immunity is still in the balance and swings from Ehrlich's to the hormone theory. Treatment is as varied as the four winds of heaven, but what I wish to dwell on are the underlying conditions that influence recovery.

Complications and sequelae may be more serious than the disease itself, as many of us have seen in the influenza epidemic. With malignancy under discussion we are attracted to the many complications that are confronted; whether it is malnutrition, anemia, toxemia, asthenia, obstruction or lack of resistance, they are all factors that hinder and prolong convalescence.

Why depend on a one-cylinder measure when a twin six will do it better, quicker and lighten the load? Lessen or abolish the complications and you will be surprised at the display of formative energy that is manifest in many of the bad cases.

Before closing I wish to emphasize the slogan of "Safety First" and remind you of the prophylactic issue that should always be foremost.

DR. C. H. VIOL, Pittsburgh. Since Dr. Pfahler has mentioned the paper of Dr. Boggs, and as I have worked with Dr. Boggs, I will discuss the paper for a minute or two. Dr. Pfahler probably saw a typed copy of Dr. Boggs's paper and we found after it had been sent that we had omitted a very important paragraph, and one which very radically changes the tenor of that paper, for you get the impression that there was a very wide divergence between radium and roentgen rays, and that is true if you consider your roentgen rays as a changing source which you can move off, and the radium one which you can move back only a few centimeters so as to even up the divergence effect. The paragraph which was omitted was discovered at the last moment, and was to the effect that if you make a distribution of your radium you very considerably cut down the effect on the surface and so very greatly enhance the effect below the skin surface. If you arrange the radium in a distribution over the surface, getting a plaque effect, you can get about the same effect as with the roentgen tube back to 25 cm. If the radium is considered as just a point source, then it would be almost a clinical impossibility to produce anything like favorable results in the treatment of mediastinal tumors, and I believe there are reports of quite favorable results in the treatment of these tumors where only radium was used. I am sorry the omission of the paragraph in the paper gave such an unfortunate impression, for our whole effort was to determine how you might save the skin from damage by spreading the radium out and thus enhancing the skin effect.

One thing more occurs to me, and that is the statement of Dr. Schmitz that the action of the gamma rays was limited to 6 centimeters, and Dr. Pfahler's argument that in the treat-

ment of the large fibroids radium would be of no use. I believe it is hardly fair to carry this over to a benign growth, for the conclusions refer to a malignant type which is more difficult to influence. You can get a much wider effect in the fibroids than in the carcinomata.

Dr. Henry Schmitz, Chicago. One of my statements has been misinterpreted. I did not state that the actual extent of the radium rays was 6 centimeters. In my opinion rays are not limited as to distance. It is a question of the intensity of the rays at any distance whether they are therapeutically active or not. The intensity of rays depends on amount and duration of the exposure. Dr. Janeway's determination of dosage in millicuries is very interesting and important. To every cubic millimeter of tissue there must be used an additional amount of emanation, and a tumor of a diameter of 12 centimeters requires 50 millicuries. The emanation tubes are placed in the tumor and left behind. In other words my deductions, using radium salts, are almost the same. If 50 milligrams element is probably the lethal amount for the treatment of carcinoma of the uterus, I agree almost perfectly with Dr. Janeway's findings.

The paper of Dr. Pfahler is very scholarly. It seems to me that the results of ray therapy in cancer of the breast have been better than in any other region of the body.

Concerning the application of the roentgen ray: We divide the chest wall in squares of about 4 inches, using 8 squares anteriorly and 8 posteriorly and one each over both shoulder and neck regions.

If we are positive that pathology is not present on one side we treat only the affected half. The filter is 10 mm. aluminum, the focal distance about 10 inches, the milliamperage 5 and the voltage 100,000. The duration of application to each square is 45 minutes. We apply a course of treatment within as short an interval of time as possible. If the patient's condition permits it we may finish the treatment in a single day.

Dr. Henry K. Pancoast, Philadelphia. I think Dr. Schmitz's reference to standardizing their results is very pertinent at this time. In a recent number of the Journal of the American Medical Association statistics were given from an article published in Germany of a series of cases of carcinoma of the breast treated postoperatively and another series of cases not so treated, in which the claim was made that the patients lived longer without postoperative treatment than with it. The matter has been taken up by a number of surgeons and a great deal has been made of it, so I think if we can get some statistics in this country showing that patients are undoubtedly benefited by postoperative treatment, now is the time to secure them.

Dr. G. Failla, New York City. I should like to say just a few words about Dr. Janeway's doses for buried emanation. In a tumor 1 centimeter in diameter Dr. Janeway uses a dose of 5 millicuries. This means that he inserts into the tumor three or more tiny glass tubes containing a total of 5 millicuries of radium emanation. The tubes are distributed throughout the tumor mass as evenly as possible, and they are left in the tissue indefinitely or until they slough out. The emanation in the meantime is decaying at the rate of one half in 3.85 days, so that the radiation is getting weaker and weaker all the time. At the end of some weeks, depending on the initial amount of emanation used, the radiation is so feeble that it has no effect on the tissue. It will be noted, therefore, that there is a great variation in the intensity of irradiation between the first part of the treatment and the last. If we want to express the dose in millicurie-hours, we multipy the number of millicuries by 132, this being the average life of the emanation. When radium is used for the treatments, it is applied for a certain time and then removed, and the effect depends very markedly on the length of exposure. Therefore, it is impossible to compare the amount of emanation buried in a tumor with the amount of radium used for a similar treatment. The only thing we can do is to compare the above doses for buried emanation in millicurie-hours with the dose in milligram-hours for *treatment with radium needles.* But in this case, if we use the needles for the same number of milligram-hours as millicurie-hours calculated in the manner indicated above, we find that the effect is considerably more marked than in the case of the buried emanation. In other words, with radium needles, unless we use a smaller dose, we get too severe a reaction.

Dr. Albert Soiland, Los Angeles. There is one point that I would like to have some information on. Dr. Pfahler has covered the subject in as splendid a way as can be, but there is one sequela that has always disturbed me. That is the tremendous swelling of the arm which is such a distressing symptom in many postoperative cases. I have had only mediocre success in dealing with such conditions, and if there is any way of helping these poor people I wish somebody would tell us.

Dr. George E. Pfahler, Philadelphia. First, in regard to Dr. Viol's criticism. I am not making Dr. Viol or Dr. Boggs responsible for anything in my paper except their own observations. If they are wrong about that—I quoted them, and I also borrowed from Dr. Viol the paper of Dr. Rutherford and did not get anything out of it except what I got out of Dr. Viol's paper. I do not say that radium cannot produce mediastinal effects, but I am saying that as it is ordinarily used by the average man in the usual amount very little mediastinal effect is produced. I know when you are using that amount you will not produce the same results which you can produce with the roentgen rays. Let us use what we have. We all have the radium and the roentgen rays. I know that Dr. Kelly did cause the disappearance of some mediastinal tumors, but he has 5 grams and he uses it at 25 cm. from the skin. With our small amounts we cannot do that. There is a place for radium and a place for the roentgen rays; let us use them both and use them skillfully and produce results. There is use for all we have.

In regard to transferring the effect of radium from cancer to the effect on the uterine fibroid, I am not transferring it; but do not forget that much of the effect you get on the fibroid is due to the action of the radium on the ovary and not on the large growth itself, while if we are working with the roentgen rays we can radiate more particularly the growth itself.

Dr. Henry Schmitz, Chicago. I would like to be permitted to say just a few words in regard to a matter that was brought up by Dr. Pfahler just now concerning the action of radiation on the ovaries.

The ovaries are in most instances 8 cm. from the uterine cavity. When radium is inserted into the uterine cavity it is usually left for twelve hours. If the erythema skin dose at 1 cm. distance is 100 mg. e. hrs., then at 8 cm. distance it would be 6400 mg. e. hrs. The sensibility of the ovary in comparison with the sensitiveness of the epithelial elements of the skin to the ray is about one-fifth of the latter. In other words, one-fifth the amount of an erythema skin dose will suffice to produce the same effect on the ovarian cells. Or, if it takes 100 mg. radium element hours to produce this effect on the skin it will take only 20 mg. radium element hours for the ovary. If we divide 6400 by 5 we obtain 1200 mg. element hours as the dosage necessary to cause degeneration of the ovarian cells. Hence the 600 mg. e. hrs. applied for uterine hemorrhages have little effect on the ovary. The cessation of the bleeding is due solely to the action of radium rays on the endometrium. Part of the endometrium receives an erythema dose, or a first degree burn, another part a second degree burn, and the portion in the immediate surroundings of the radium a third degree burn. If the endometrium is completely destroyed an amenorrhea results; if the endometrium is only partially destroyed, oligomenorrhea occurs.

Radium rays have no effect at all on the myoma if it is composed of old connective tissue. The myoma will disappear after radiation if it is chiefly made up of young, undifferentiated fibroblasts.

Dr. George E. Pfahler, Philadelphia. I just want to say that we are not differing at all. We may be differing in our terminology, but we understand each other. We do know that the ovaries are five times as sensitive as the skin and we know we are getting an effect on the ovaries. It was a surgical observation that if the ovaries were removed the fibroid would at times disappear, or even if the menopause came on the fibroid at times disappeared. We do produce an action, a direct action, on the tumor itself by the roentgen rays. Dr. McGlinn and I have proven this in one case at least in which the tumor's presence was demonstrated by abdominal section, and we knew the location and size of it, and caused the disappearance of the fibroid completely without ever stopping the menstruation at all, and just as soon as we permitted intercourse pregnancy took place and a healthy child was born. That is clean proof that the

action of the roentgen rays can be limited entirely to the tumor.

Now with regard to the treatment of the breast cases with enormous doses, such as Dr. Schmitz is giving. I used to do that, more as a convenience than anything else, until the patients began to get so sick I found I would have no practice if I continued it. Therefore, I now try to produce no constitutional effect, and I find that I cannot usually give more than four doses. At times I can give almost any amount, but generally we give only four doses and frequently we cut that down to two or one, but I find you can give two doses each day better than four every other day, and it is entirely possible that we shall come back to treating these patients every day and avoid the constitutional effects. I think we should avoid them, for I believe they are harmful to the patient. I do not know just why they occur, but I think it must be due to the radiation. I had one patient to whom I gave eight doses, and then I cut down and down until I was giving only one. Then she said, "Doctor, I get sick every time and I would like to have all the treatment to-day and get it over with. I want it and I will take all the risk." So I gave her sixteen doses that day and she did not get sick at all.

Dr. Soiland's swollen arm problem is not new to us as radiologists; it was a surgeon's problem long before. We know it may be due to scar tissue around the blood vessels, or it may be due to malignant disease, or both. If it is due to malignant disease we must get rid of that malignant disease. Frequently we can get rid of it by treating the area either with radium or roentgen rays. If I can feel any hard mass I use radium locally over this mass or cross-fire over it with the roentgen rays, but roentgen rays and radium must not be used through the same area of skin. In addition, I instruct the patients how to apply an elastic washable cotton bandage and have them apply it every day and keep on applying it until you can coax nature to help you out.

CONGENITAL (HEREDITARY) ABSENCE OF MIDDLE JOINT OF LITTLE FINGER

By T. C. BONNEY, D.D.S.

ABERDEEN, S. D.

CONGENITAL skeletal anomalies are not rare, but we have felt this case worthy of report as it is possible to trace the condition back for three generations.

In the patient (Mr. J. H., age nineteen years), the little finger shows no sign of a middle joint, and it was impossible to make out any irregularity of the bone on very firm pressure. It was therefore with some little surprise that we noted the rudimentary joint as shown in the accompanying radiograph.

Tracing the condition back we found it to be present in the father and in the paternal grandmother.

Of three brothers, one has the condition present in the little finger, one in the little and ring and the third in the little, ring and middle fingers, it being bilateral in all the persons affected.

TREATMENT OF ANGIOMATA WITH RADIUM*

By WILLIAM S. NEWCOMET, M.D.

PHILADELPHIA, PA.

MANY methods have been employed in the treatment of angiomata, and here, as in other fields, where a great number of remedies have been recommended, none has been found to be perfectly satisfactory. There is not a class of cases coming under our observation that will tax the judgment of the operator to a greater extent. In the majority, treatment of the lesion is desired for the cosmetic result, and in no way does it disturb the health or comfort of the individual. In another group the mass interferes with the free movement of some part, as the eyelid or mouth, or it may be subjected to constant irritation from contact with clothing, and in a very small group life itself may depend upon its prompt removal.

The use of radium should be the ideal method for the destruction of all nevi. The high radiation penetrates the tissues, causes an inflammatory reaction, and a certain number of cells, scattered through the tissue, are destroyed, but not *en masse*, as observed when caustics, hot water, CO_2 ice, and the various electrical methods are employed. The actual practice often proves the fallacy of these theories. There are cases, however, where some of these forms of treatment are preferred to radium, for instance, those lesions in the neighborhood of the hairy portion of the face, those which are quite small and show no tendency to spread, or the very superficial hemangiomata.

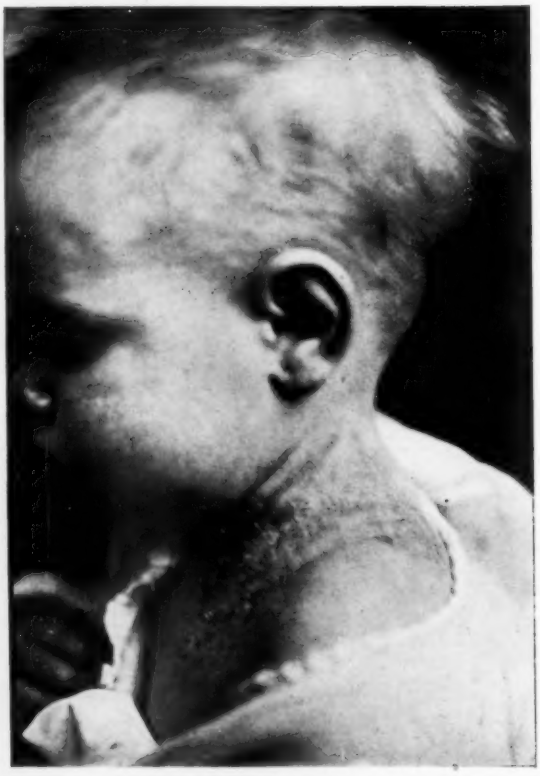
The nevus should be treated as soon as possible after discovery. The usual history of these cases shows spontaneous enlargement. They may remain quiescent for years, then from no assignable cause, or after an acute illness, suddenly take on a new growth, or undergo malignant degeneration. In the course of a few days or weeks, rarely longer, they often extend from a very small area to many times the original size. If they occur at birth, their destruction in early childhood will allow a regeneration of the skin that is not to be expected in later life. But it must be remembered that all these cases greatly improve as time passes, barring those unfortunate instances where complications mar the result.

For convenience in treatment, we may divide these lesions into three classes; (1) the hemangiomas, (2) lymphangiomas, and (3) the pigmented angiomas. While being quite distinct, they will at times blend so closely as to make the line of demarkation almost impossible, although as types they are distinct entities with a different arrangement of the tissue structure. Excepting the small pigmented mole, which is very common, the hemangioma is the usual type. These are again subdivided according to the predominating class of vessel which they contain, but their treatment by radiation is governed not so much by their tissue structure as by their size and distribution.

Small hemangiomas, like the pigmented variety, are easily treated by many simple methods with good results. But as the lesion increases in size so does the difficulty in its treatment. Several cases have come under observation where the whole arm and part of the body were involved; in one, an *x*-ray examination of the part showed that the bones of that member had developed to a greater degree than the opposite side—in other words there was an active development of the whole area; in these cases treatment seemed inadvisable.

Where they exist upon the face and cover a considerable portion of it, the normal tissues are to a great extent replaced by the vessels, which after contraction leave principally scar tissue. The epithelial elements are necessarily widely scattered, and under ordinary circumstances are most sensitive to any

*Read at the Fifth Annual Meeting of THE AMERICAN RADIUM SOCIETY, New Orleans, La., April 26, 1920.



FIGS. 1, 2. W. S. (CASE 147). Nine months. 6284 mgh. in seventeen treatments. In tubes from 50 to 140 mg. The last picture was made about the time when the reaction of the radium was disappearing. The neck was powdered, which gives the roughened surface noticed in the photograph. Notice in the first picture the size of the vessels.

form of radiation. The more highly they are developed the greater their susceptibility. These must to a great degree be replaced by the connective tissue elements. Naturally there is no form of treatment which will give a normal skin, with the usual hair or down, involuntary muscle and glandular structures, all so essential in the face for the changes caused by expression, blushing or the change of temperature.

These facts must be considered when such lesions are presented for treatment, and the patient should be fully advised lest disappointment follow the absence of normal skin as the ultimate result.

Two cases of lymphangioma came under observation, but the result of treatment was not satisfactory. One supposed pigmented mole proved to be a melanotic sarcoma, and while local radiation might have been selected, in this instance the diagnosis was most important in the light of subsequent developments. The history of a sudden enlargement of an ordinary mole should always be looked upon with suspicion. But under ordinary circumstances, large moles, even covered with hair, if they have a deeply infiltrated base, give good results under radiation.

TECHNIQUE

The development of a standard technique is absolutely essential, and the results depend largely upon obtaining the proper amount of radiation. In determining the dosage it is better to underestimate it than to produce reaction that results in ulceration. If it should be necessary to radiate the part again, remember it will not tolerate the dosage of the first application. The amount usually given is about an erythema dose, which must be judged according to the applicator used, the filter and the skin distance. The last factor is by far the most important, and varies according to the depth of the nevus. If it is deep, the applicator is placed from 3 to 6 centimeters away and moved frequently to produce "cross-fire" effect.

But in the more superficial types, the applicator is placed 1 to 3 centimeters skin-distance. Naturally the length of exposure is increased with the distance.

Most writers upon this subject have treated these lesions purely from their surface, to a great extent disregarding their depth, which would seem a most potent factor. Remembering the rule of radiation, the applicator should be elevated from the skin to such a distance that by the number of movements the deep parts of the nevus will receive about the same amount of radiation as the more superficial structures.

Flat applicators of radium, tubes of radium and emanation have been used. Flat applicators were used with the idea of obtaining uniform radiation over a given surface; but as the surface of these lesions was rarely flat, and furthermore was never the size and shape of the applicator, they were discarded, and tubes were used exclusively. In treating large areas it is necessary to have about the same amount of reaction over the whole surface, thus obviating the "checker-board" effect, as it is extremely difficult to join the edges of the radiated parts.

Great care should be taken with the skin that adjoins the nevus, particularly if it ends abruptly. It will be found many times more sensitive, and will break down while the vascular tissues appear to be unharmed. Protection of the skin with lead at the border line is not sufficient, and here again distance appears to be the factor. If the protecting filters are used they should extend slightly over the edge of the nevus rather than expose the skin.

In cases where previous treatment consisted of CO_2 ice, hot water, iodine or electricity, and was not sufficient to eradicate the lesion, the same care must be observed in applying radium as though the part had been formerly radiated.

Angiomata that appear upon the face, and extend into the mouth or nose, must be given great care in radiating the two surfaces, as the skin appears to be somewhat

FIGS. 3, 4. M. M. H. Four months. Hemangioma of the face. The gangrenous area was present when the baby came under observation; the mother could give no reason for it. 1590 mgh. in 25 sittings about three hours each. Radium 50 mg., 1 mm. lead and 2 cm. gauze filter. Treatment had no effect upon the gangrenous area.

FIGS. 5, 6, 7. H. D. (CASE 299). Hemangioma of upper lip. Notice the ulceration; no cause to explain it. Child was seven months old when treatment began, and at no time was its feeding interrupted. Notice most of the lesion was covered with healthy skin, the blood vessels being deep, except in the ulcerated area. Treatment, radium 345 mgh., 4 applications; 40 mg. for 2½ 20 mg. for 3 hours. Applied July 12, 24, Aug. 18, 29. Applied in tubes 1 mm. lead, ¼ gauze filter.

more susceptible, and if one or the other had been radiated at a previous time, that fact must not be forgotten when radium is to be applied to the other surface.

It is impossible at this time, to give any exact dosage, owing to the wide variation in the size and position of the lesions and the difficulties that often attend the application. However the correlation of these figures will in time give a better idea of uniformity and will likewise improve our results.

COMPLICATIONS

The reaction set up by radium causes a low grade inflammation of the radiated part,

and this gives rise to a burning sensation or an itching. It is often difficult to keep young children from rubbing or scratching the affected area even when protected by bandages, and thus producing a troublesome ulceration, with necessarily more scarring than would naturally be expected, as a result of the infection which often occurs from the breaking of the skin.

An unfortunate coincidence occurred while treating a young girl five years of age who had a pigmented angioma 1½ centimeters wide and 3 centimeters long, with a very vascular base, situated on the side of the nose. She contracted measles from the other children in the family when the radium reaction was at its height. The whole face became swollen to an alarming degree; the area became gangrenous, and the general systemic reaction was severe. When the child recovered an annoying ulcer was left which healed, but did not entirely remove the angioma. The result was not pleasing but further treatment was declined.

Three cases have come to notice where the nevi had undergone a spontaneous local gangrene from no definite cause. In all instances the babies were only a few months old when seen, and the nevi were large and

FIGS. 8, 9, 10. K. T. Fifteen months. Had been treated by the injection of boiling water. The gangrenous areas shown in the first picture. Second picture shows the lower portion of the mass treated by radium, while the former area was healing. Third result after radium over the whole area. Notice the depth of the mass as seen by comparing the nose and mouth. 4936 mgh. in in sixty treatments; 1 mm. lead and 2 cm. elevation; 5 to 20 mg. tubes for 3 to 4 hours.

FIGS 11, 12. T. M. Hemangioma of elbow, ninth month. Gradual enlargement since birth. 11 mgr. tube of silver. Sixteen applications in three months. Total 637 mgh.

very blue. They were given close attention for a few weeks, but there seemed to be very little change in the process, and it was decided to begin treatment. Two produced very good results, while the third passed from observation. The ulceration had very little influence upon the contracting nevi, but, as might be expected, a scar was left over the affected area.

FIG. 13. H. S. Hemangioma. An attempt was made to remove it with CO ice. An ugly granuloma developed upon the nauss that bled easily and discharged a very foul pus. Treatment, radium 2248 mgh. in eighteen treatments.

The use of CO_2 ice in two cases, and in another hot water injected into the tissues, caused large gangrenous areas with foul discharges. Considerable granulation tissue protruded from the ulcerated areas in one case, and for a time it was thought to have undergone a sarcomatous degeneration. All, however, yielded very good results with some slight scarring.

There is no doubt that the foregoing methods have some degree of usefulness when applied in suitable cases and by experienced operators; but in very large vascular nevi, their value is doubtful if not dangerous, and under such conditions radium can be used with a much greater degree of safety, and decidedly less scarring.

DIFFICULTIES OF APPLICATION

The irregularity in the size, shape of the lesion, depth, size of the vessels, age of the patient, amount of radium to be employed and the manner of its application, are all important factors to be considered in the treatment of angiomata. Are the results better from the use of small amounts, as 10 milligrams, or from larger amounts, as 100 or 200 milligrams? The question is still un-

settled, although the outcome from both has been satisfactory.

Some annoyance has been caused by the slipping of the applicator. This was especially liable to occur in young children, and to avoid this complication a cast was made of all cases and the radium and filters attached to it. If there is any change in the contour of the skin due to muscular movements, the cast will automatically readjust itself after the parts assume their natural position, while if a pad or cone is used and the dressing slips, the whole prescribed area as well as the direction of the treatment has been changed.

SELECTION OF CASES

The use of radium in the destruction of small nevi would not be recommended, since good results may be obtained by many other methods. The superficial hemangiomata and the thin pigmented mole extending over a large area can be successfully treated by the quartz lamp or high frequency. But if radium is to be used a very careful technic must be followed, lest the after-effects be far worse than the original condition. When angiomas with large vessels extend deeply into the tissues in the neighborhood of large nerves and important structures that cannot be destroyed, then radium performs its greatest mission.

In a list of about 200 cases of angiomata of all forms, 5 died, 2 were infants with large hemangiomata, 2 women and 1 man proved to be types of sarcomas, 86 were selected for treatment with radium, and of these 7 were failures and 17 disappeared from observation. The result in 62 cases was all that could be desired, with very little scarring and no after-effects.

SEQUELLAE

The formation of keloid often arises from a too intense radiation. But it must be remembered that the skin of certain individuals develops keloids under very slight provocation, in some instances even upon the slightest amount of burning, especially if it extends to the degree of vesication.

Telangiectasis is often most annoying and will occur at times even when the greatest care is exercised. Too long and too intense erythema is usually the cause, but the individual peculiarity of the skin must be taken into consideration. Its occurrence must therefore be regarded as accidental.

Conclusions as to the result of treatment must not be adopted until several years have passed, as it is not unusual for the skin to be perfectly clear at the time the treatment has ended, and about a year later develop quite a number of telangiectatic areas, with at times annoying keloids. But a still more annoying complication seen in two cases treated with radium and in several treated by the *x*-ray was a secondary ulceration in the site of the scar appearing a year to three years after treatment.

SUMMARY

In radium, like the *x*-ray, we have an agent that is capable under some circumstances of doing considerable harm; therefore it must be employed with great care, especially where it is impossible to judge exact dosage. It should be remembered that as a rule people live in the present and to a great extent forget the past. Therefore if a scar or a slight discoloration remains, it may be judged a bad result, with absolutely no regard to the former condition, even if it should have been quite repulsive.

Early treatment of the various forms of hemangiomata should be the absolute rule. The likelihood of rapid enlargement should always be borne in mind with the pigmented angiomata this enlargement is not so likely to occur. In either class the sooner these growths are removed the better will be the result.

DISCUSSION

DR. E. C. SAMUEL, New Orleans. There is very little that I can add after hearing the very excellent paper of Dr. Newcomet; but in our clinic when a case of one of the types that he

describes presents itself we promise neither the patient nor the parents anything at all, but make them understand from the beginning that we are just as likely to have failures or trouble as the result of the treatment as to have a good result. They are also instructed that they must keep in touch with us for at least six months. We do not promise anything under that time. I am very anxious to hear what Dr. Newcomet has to say about the length of time. In our cases it is eight months to a year. We use a little different technic from that described by him, using about 25 milligrams of radium with 2 mm. of brass, and about three turns of gauze as filter, going to four portals of entry in the course ordered, using the center as a pivot and working out from the center, giving a treatment every five days. I used in the beginning very large doses, 100 to 150 milligrams, and found that the cases in which I produced an erythema dose did not do so well as those with the so-called fractional dose, as we are using it at present. We have had some very excellent results, particularly in the hemangiomas of the lip. We have an Italian child under treatment now that we have been treating for a year and a half. He had at first a tumor anterior to the ear about the size of an adult fist that everybody in the city had turned down. Luckily the child was from New Orleans. Nobody wanted to attempt anything and the growth had started to ulcerate just at the center. Dr. Matas asked us to see what we could do (I asked the mother to come up today with the child but I guess the rain has prevented her coming) and now the growth has almost disappeared. We did not produce any erythema at any time. It is just the same as with the lip and one or two of the tongue cases. We have found with children that it is very difficult to hold any kind of applicator in contact with the growth. The cases that are over-radiated show some signs of telangiectasis, but the cases in which we use the fractional dose method have showed no such signs and I have been able to follow the majority of the cases now for three and a half to four years.

Dr. James T. Case, Battle Creek. I wish the author would please tell us specifically about his technic. How much radium he uses and for how long. I am especially curious to know how he kept the applicator in contact with the tongue. If he will give us these details I will appreciate it very much.

Dr. George E. Pfahler, Philadelphia. I have had a few nice results in these cases. I, also, am giving less than an erythema dose and I think the first thing to be careful about is not to be in a hurry. I tell these patients that it will take a year or two, or perhaps longer before they can be well. I think the tissue changes come slowly in these cases and we had better go too slowly than too fast. That is the general principle. We have all learned these principles by feeling our way carefully and I sympathize with Dr. Newcomet when he answers Dr. Case. I do not use any set rule in my work, except that I do not produce an erythema. In this way, in my experience, you get a gradual shrinking of the growth and results that in many instances are beautiful. I think the one thing is to go slowly and be careful. I do not think you can lay down any definite rule about using so and so much radium at such and such a distance in the treatment of every angioma; I cannot. I believe you will have to vary your treatment with each case. I would like to ask Dr. Newcomet, or Dr. Case, if he has used radium needles in the treatment of these angiomata and what has been the result. In some of the large cases I think they should be considered but I have not used them.

Dr. William E. Newcomet, Philadelphia. The detailed technic used in the treatment of the cases has been placed under the individual illustrations, the reason being that so far a detailed technic has not been adopted. I am still in the beginning stage, but two or three things have developed that have been of use. One is the use of the cast. It has, no doubt, saved me from bad results. It is composed of some dental compound from which a very good cast of the nevus is obtained and kept in close contact with the skin while the child is under treatment. To get the same amount of radiation over the whole area at the same time is most important, if you expect good uniform results. You must have the same amount of radiation over the whole mass, not in one corner, for if a second application is needed it will be very difficult to join a bad edge produced from the first application. It takes any-

where from six months to two and a half years and in one instance it took three years to obtain the desired results. In the illustration which shows the mass at the neck to be almost half as big as the child's head, the mass absolutel ycontracted in six months. We produced no erythema and, if the treatment is successful, no scarring. How sometimes I do it and sometimes I do not, I do not know. I wish someone would come to my assistance and tell me what happens in one case and what does not happen in another case, for I am at a loss to explain. It is a hard problem. There seems to be no uniformity in the dosage for the nevus. You can take two hemangiomas and one will stand twice the radiation that the other will. Personally I do not care for fractional doses. I, along with the rest of us, frequently use fractional doses, but far preferable is one good dose that will do the work. I believe that in after years, we shall have less trouble from complications in these cases than from those in which the fractional doses have been used. And even with the fractional doses we are at times likely to get telangictales where the dose is brought just to or beyond the erythema.

As to the use of the needles, it is a matter of judgment. It may be dangerous to employ them where the veins were large, not on account of bleeding, but embolism should be thought of, or a phlebitis. The radiation from needles is too localized. Furthermore these cases contract easily, and with more uniformity from a general radiation than from the small divided doses. For this reason I am more inclined to stick to an applicator, which is moved frequently, in preference to needles.

In regard to the differences in the child and the adult, the growing tissues of the child give a far better result than the tissues in the adult. It cannot be too strongly emphasized that all angiomata should be treated as soon after their discovery as is possible.

USEFUL ATTACHMENT TO A BOWEN DEVELOPING TANK*

By A. JUDSON QUIMBY, M.D.

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THE introduction of the Bowen tank into roentgenography has greatly simplified and facilitated the dark-room work; but all the older operators who were familiar with plate development had acquired an appreciation of mechanical devices for plate rocking which gave added value to the plate, shortening the exposure and increasing brilliancy, and in addition, conserved time and labor. Titubation was especially important in tray development, because the horizontal position of the plate in the developer did not allow the rapid removal of the solution immediately in contact with the emulsion surface. This essential can be fully appreciated by all who are familiar with photography in any of its branches, and especially by those having a knowledge of photographic chemistry.

The Bowen tank, which permits the vertical suspension of the plate or film in the developing solution, partially compensates for lack of plate movement by allowing the developer which has acted upon the emulsion to drop, as a result of its increased specific gravity, to the bottom of the tank, maintaining a circulation over the plate or film surface; but as this circulatory movement of the developing solution is in one direction, there is an inclination, especially in strong developer, for vertical streaking to take place. The writer's practice has always been to shake the plates or films in the developing tank until the image appeared, and then allow the remainder of the development to take place without disturbance; but in doing this work it has been observed that more brilliancy and better value for a given amount of exposure was obtained by maintaining plate motion during the entire process.

* Read before the Eastern Section of THE AMERICAN ROENTGEN RAY SOCIETY, Atlantic City, N. J., Jan. 31, 1920.

In attempting to solve this problem so as to reduce it to a mechanical process, the writer observed that very slight movement of the plate set up a swirl of the fluids far in excess of the plate movement, and therefore concluded but little motion was necessary, and after considering a number of probable methods, evolved the device herein illustrated. This consists of a motor about the capacity of the average 16 inch fan motor, a suitable gearing for reducing speed, which is transmitted to a cam shaft and allowing a stroke of from 20 to 40 per minute; the rate of this stroke can be further controlled by attaching a rheostat to the motor. The cam shaft drives a short fulcrum bar which is attached to a flat carrier resting upon the flat surface of the tank, intended to support the ends of the plate or film rack. If desirable, a second fulcrum bar may extend from the end of the first to the opposite end of the developing tank to a similar flat carrier, resting upon the plate rack's support. The carriers are passed through a hole in the side of the tank on a level with the supporting ledge and the distal end is maintained in a similar hole penetrating the partition between the portion of the tank containing the developing solution and hot or cold water section.

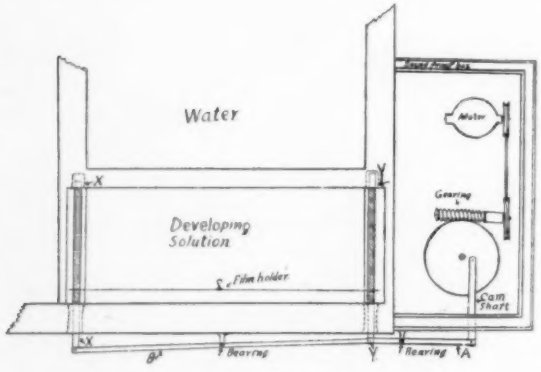

FIG. 1. A USEFUL ATTACHMENT TO A BOWEN TANK TO MAINTAIN MOTION OF PLATES OR FILMS DURING DEVELOPMENT. A and B, Transmission Levers. X and Y, Plate Rack Carriers. If only one is used a 5/8 in. stroke is necessary. If one at each end of tank a 1/4 in. stroke will do.

The device herein illustrated and described is fitted to the form of tank sections running transversely; if tank sections run from front to back the motion of the cam shaft can be carried to the plate rack carrier by a rearrangement, one carrier by direct attachment to the cam, the other by the same arrangement as above described.

Having some old plate racks and gearing in my laboratory, I constructed apparatus, which has been in use two years, out of a discarded fan motor and the gearing of an old K-K titubator, and used pieces of the handle portion of plate racks to make the driving shafts and plate rack carriers, so using the same material as the plate holders, which are composed of alloys very resistant to the corrosive action of the developing solution.

In my experience the single carrier has been found to impart motion to plates sufficient to prevent streaking, hasten development, and add brilliancy, and also be a great factor in economy of time. The stroke of the horizontal carrier which supports the plates should be 5/8 inch if a single bar is used, and 1/4 inch if the bars are placed at each end of the tank. I have also found it best to continue plate motion throughout the entire development of the plate, and the best stroke period is about 30 per minute. The motor and gearing are enclosed in a soundproof box.

OSTEOCHONDRAL TROPHOPATHY OF THE HIP-JOINT. LEGG'S DISEASE. REPORT OF FOUR CASES.

By W. E. REILEY, M.D.

CLEARFIELD, PA.

SINCE the meeting of the American Orthopedic Association in June, 1909, when Arthur T. Legg cited five cases of what he then differentiated as "an obscure affection of the hip-joint," numerous reports covering several hundred cases have been published in this country. These have either confirmed the original observations or have added some new details to the knowledge of this condition.

It has seemed a singular coincidence that in a clinic where joint disease of childhood is a rarity, four cases should have come under observation within the brief period of fifteen months thus during a period of ten years at our hospital, making the incidence of this pathological condition exactly the same as for congenital dislocation of the hip and tuberculosis of the hip-joint.

The following report of four cases, only one of which was treated in the hospital, does not add any new observations, but confirms the findings of some of the other writers. The ages at onset range from six to ten years; two were boys and two were girls; in three cases the right, and in one the left hip was affected. Pain was observed in only one case and was very severe until the joint was immobilized. All showed marked thickening of the neck of the affected femur, but there is no involvement of the non-affected side. The children were all robust and there was a distinct difference in the muscular development of the lower extremities of the two boys, while the girls coming under observation earlier did not show it to the same extent at the time of the first examination. The appearance of the acetabulum on the *x*-ray plate is considerably altered in two and slightly in one. Its density is somewhat variable and the rim irregular or roughened. Two show an area of decreased density of the diaphysis bordering the epiphyseal line, which is irregular in all. A history of traumatism was obtained but once, no reliable statement was obtained in one and traumatism was absolutely denied by two. No Wassermann reactions were done. Careful examination failed to elicit any of the stigmata of hereditary syphilis and hence it is not entertained as an etiological factor in this series.

Report of Cases.

Case I. P. F. Boy, eight. October, 1916, left hip. Always healthy and robust. Two years ago noticed limp after prolonged and active exercise, but no pain at any time. Very slight shortening; motion noticeably limited in abduction, but no muscular spasm. Six months ago the mother became alarmed over the perceptible muscular atrophy of the left thigh and leg. Fell from a tree a short time before the limp first attracted attention. Roentgenogram shows the characteristic

Fig. 1. Case I. October 1916. Left hip: Two years' duration. Shows a very much flattened and thinned epiphysis which appears to be divided into several pieces. Neck much thickened.

*Thesis presented with application for membership in The American Roentgen Ray Society, 1919.

changes all present at the first examination and are probably terminal. Case came under observation but once.

CASE II. Z. S. Girl, eight. December, 1916, right hip. Always very healthy but has moderately enlarged tonsils. For the past ten weeks has had a limp after prolonged effort. For two weeks pain at night in thigh above the knee very severe. Never seems to have had any fever. Had a hard fall when a baby but no knowledge of any traumatism since. Roentgenogram at this time shows lessened density of the neck along the epiphyseal line and lack of definiteness of the line. These findings were not fully appreciated at this time and it was thought that this was a case of early tuberculosis of the hip-joint in which the bony changes had not yet become apparent.

Second *x*-ray examination, October, 1917, shows the classical changes all present now. The epiphysis is much flattened and of irregular density, the articular space apparently enlarged and marked hypertrophy of the neck.

Third examination, April, 1919, shows the terminal stage. There has been no further change since the second examination, which would seem to prove that early immobilization in this case has prevented the usual amount of flattening of the epiphysis. There is no noticeable limp.

CASE III. S. P. Boy (Slavish parentage) eleven, May, 1917, right hip. Symptoms have been of one year's duration. Poor history obtained because no interpreter available at the time. Has a very decided limp and abduction markedly limited, but no muscular spasm. Roentgenogram shows the characteristic changes at the time of the first examination; flattening of the epiphysis, irregular density, thickening of the neck and

FIG. 2. CASE II. December, 1916, right hip; twelve weeks' duration. Shows lessened density on the shaft side of the epiphyseal line.

FIG. 3. CASE II. October, 1917. Ten months later, all of the characteristic changes of Legg's disease may be seen.

FIG. 4. CASE III. May, 1917. One year's duration. Decided limp and abduction markedly limited. All of the characteristic changes now present.

a rather marked change in the contour of the acetabulum.

Second examination, July, 1917, shows an increase of the irregularity of the acetabulum and increased density of the epiphysis.

CASE IV. M. R. Girl, ten, January, 1918, right hip. Has always been robust. For the past four months has developed a limp after prolonged exercise, without any pain. Attention first attracted by mother having noticed the atrophy of the muscles of the affected extremity. There is no shortening, no limited motion and no muscular spasm. The lameness increased to such an extent during the two months following that a short spica was required.

FIG. 5. CASE III. July, 1917. The amount of roughening of the acetabulum has increased and the epiphysis seems to be denser.

Second examination, July, 1918, shows accentuation of the previous findings. The epiphysis shows some increase in size and density, the neck is very much thickened and there is a flattened *x*-ray appearance of the acetabulum.

CONCLUSIONS

The fact that two of these cases had been previously diagnosed as tuberculosis of the hip-joint emphasizes the importance of careful differential roentgen diagnosis in all cases of hip-joint disease.

The number of cases of Legg's disease coming under observation in this locality seems to be out of proportion to the number of children suffering from other hip-joint

FIG. 6. CASE IV. January, 1918. Pronounced flattening of the epiphysis with change in density of the bone bordering on the epiphyseal line. Change in the shape of the acetabulum is apparent.

FIG. 7. CASE IV. July, 1918. The characteristic changes are all present at this time. There has been considerable change in the shape of the acetabulum.

affections and would apparently corroborate the statement of Taylor and Frieder: "It is evidently not very rare and its inclusion with cases of hip tuberculosis must have seriously distorted the symptomatology and statistics of that disease, especially as to the results of treatment."

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FACTURES OF THE BONES OF THE FACE

By CHAS. F. BOWEN, M.D.

COLUMBUS, OHIO.

ROENTGENOLOGISTS are frequently called upon to examine the bones of the face, to determine the presence or absence of fractures. This is readily determined in the case of a few of the bones, but in others the usual posterior-anterior and lateral views are really of very little help, and if a fracture is actually seen, the extent of the damage done is not always apparent.

In studying head plates made in the Waters position, I was impressed with the clearness with which the outlines of the malar and superior maxillary bones and the zygomatic arch is brought out. I was convinced that this position or modification would be best suited to demonstrate certain fractures of the face.

Fractures of the face are the result of a crushing blow which produces a caving in either of the orbit, maxillary antrum or the zygoma. Such accidents are soon followed by considerable swelling of the soft tissues, which makes an accurate examination impossible. Ten days or two weeks usually elapse before the soft tissues return to near normal, when it is discovered that the cheek is sunken or depressed. It is then usually too late to elevate the fragments and to restore the facial lines to somewhere near normal. It is evident, then, that the extent of the caving in or the displacement of the fragments is of the utmost importance. With

Fig. 1. Ray Passing Through Top of Head.

*Read before the Middle Section of The American Roentgen Ray Society, Chicago, February 22, 1920.

radiographs made in the position described below, the injured parts can be readily compared with the opposite normal side and the exact condition explained to the surgeon and patient.

Plates are made in a position similar to the usual posterior-anterior frontal sinus position, either sitting or lying, except that the chin and nose are touching the plate. The ray is centered over the central incisors and passes straight down through the top of the head (Fig. 1). A piece of cardboard between the head and the cone will help to steady the head and protect the hair.

Fig. 2 shows at a glance that the maxillary antrum is obliterated on one side, which was caused by the malar bone being driven inward. There has been a fracture of the frontal process of the malar bone (1) with a displacement into the orbit of ¼ inch, a fracture of the zygoma (2), and a fracture of the outer wall of the antrum (3). These three fractures are the only ones which show in the print, but of course there was a crushing of the thinner bone plates of the upper part of the antrum when the outer wall of the cavity collapsed.

Fig. 3 shows fractures as follows: Fracture of the external angular process of the frontal bone (1), superior maxillary extending from the orbit into the nasal cavity (2), malar bone through the body (3), malar bone through the zygomatic arch (4), zygomatic arch (5), zygomatic arch (6).

Such plates show at a glance the amount of destruction of bone and the extent of the deformity or caving in of the cavities which exists. The deformities can be corrected, or else the patient told and shown the extent of the deformity which is going to result from the accident, and perhaps damage suits can be avoided.

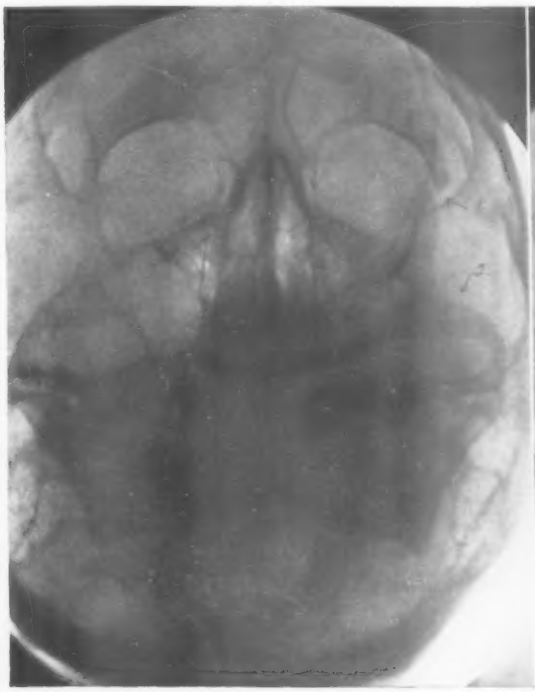


Fig. 2. Maxillary Antrum Obliterated on One Side.

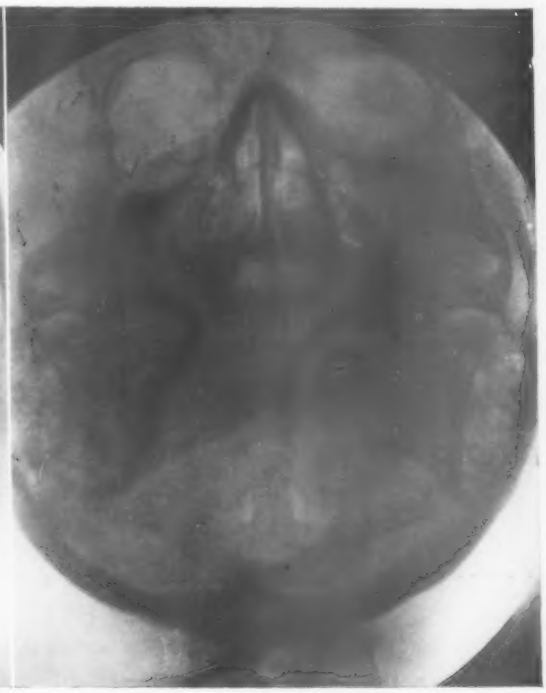


Fig. 3. Showing a Series of Fractures.

TELEROENTGENOGRAPHY OF THE SELLA TURCICA WITH OBSERVATIONS ON ONE HUNDRED NORMAL CASES

By C. HARVEY JEWETT, M.D.

The Clifton Springs Sanitarium

CLIFTON SPRINGS, N. Y.

THE original idea in carrying out this piece of work was an attempt to establish some fairly definite standard of size, shape and normal variations of the sella turcica in apparently normal healthy individuals, so that one might have some basis for comparison in the interpretation of questionable cases.

Teleroentgenography offers the most accurate method of reproducing the exact size of the sella turcica, and direct lateral plates were used in all cases. It was found by experimentation that an object 1 cm. in diameter placed at a distance of 4 inches from a photographic plate with a plate target distance of 15 inches, resulted in an enlargement of approximately 35 per cent of the diameter of the object. This experiment would simulate the conditions of an ordinary short plate target distance. With the plate target distance increased to 5 feet the increase in diameter was only approximately 5 per cent. It was also found possible to obtain a clearer plate at this distance. The work was done using a medium focus Coolidge tube with duplitized films and double intensifying screens.

The individuals selected for the work ranged in age from sixteen to eighty-one years, with an average age of thirty-two. Sixty-eight were females, and thirty-two males. The weight ranged from 86 to 200 pounds with an average of 146 pounds. All were supposedly in good health, with no gross evidence of internal glandular disturbance. The measurements of the sella turcica were taken with calipers, obtaining the longest antero-posterior diameter in a general horizontal plane. The vertical measurements were taken by bisecting a line drawn between the anterior and posterior clinoid processes, and dropping a line very nearly perpendicular to the deepest point of the floor of the sella. In some instances where vertical measurements were impossible they were omitted from the calculations. The antero-posterior diameter of the skull was taken from the frontal prominence to the occipital protuberance externally, and the vertical diameter from the vertex to the base of the sphenoid.

On studying the roentgenograms of the sella turcica it was found that they could be roughly divided into eight groups, ranging according to their general structural characteristics regardless of size. For purposes of classification a ninth or miscellaneous group was added, containing a number which did not fall into any definite class, but showed unusual variations. Several rearrangements of the groups resulted in some variations of classification each time, due to the fact that certain groups simulated each other very closely, and all shades of variation were found. In general, however, the most satisfactory classification is as follows:

GROUP I showed structurally long, slim, curved posterior clinoid processes with absence of anterior clinoid processes. This group closely simulates Group III, except for the fact that the latter has a small light anterior clinoid process. It is noteworthy that the statistics of this group show the lowest average age (with the exception of one other group of the same age) and the highest average measurements of the sella, both horizontally and vertically, and the highest average antero-posterior cranial measurement.

GROUP II shows nearly vertical lightweight posterior clinoid processes with wide open infundibulum and absent or extremely indistinct small anterior clinoid processes.

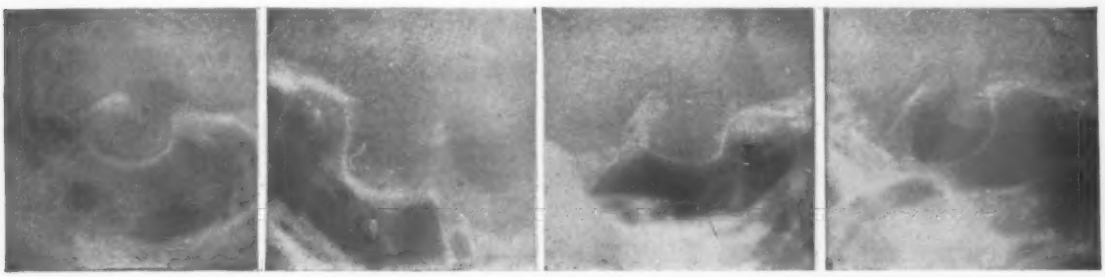
This group is similar to Group VIII, the latter having distinct anterior processes. The statistics of this group are not distinctive, except for the fact that it contains the largest number of cases.

GROUP III, as noted above, is similar to Group I, except for the presence of small, light, anterior clinoid processes projecting horizontally backward. The small size and the direction of these processes are the only definite distinctions between this and Group VII. There are no distinctive features regarding the statistics.

GROUP IV is characterized in general by a very heavy anterior clinoid process, projecting directly backward and occupying a somewhat lower level than the tip of the posterior processes. The group might also be considered similar to Group VII, except for the difference in the construction of the processes. The average height in these cases is the greatest.

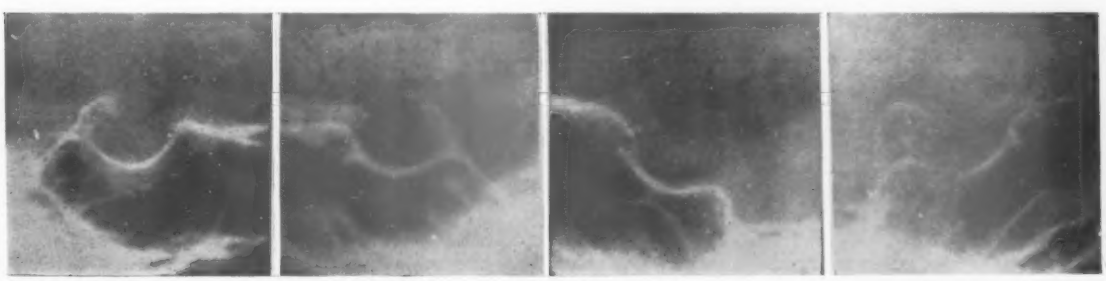
GROUP V gives the appearance of a shallow floor with very indistinct thick processes and wide infundibular spaces. The statistics show this group to be of the highest average age.

GROUP VI gives the appearance of complete bridging over of the sella turcica, most of the cases showing heavy processes. It is possible that slight rotation of the head might show a different picture, but this was not observed in several cases that were repeated. The appearance of bridging over in this case is undoubtedly due in most instances to the superimposing of shadows. It is interesting to note that the measurements of the sella turcica were the smallest in this group, and that as many as 10 per cent of the 100 cases studied showed bridging over. This group also shows the shortest longitudinal and the longest vertical cranial diameters.



GROUP 1 GROUP 2 GROUP 2 GROUP 4

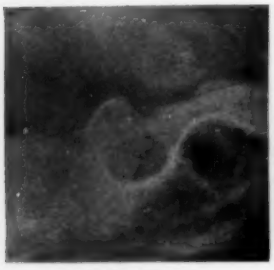
GROUP VII, as previously mentioned, closely simulates Group III, but the most distinctive cases of this group show anterior and posterior clinoid processes of about equal length with small infundibular spaces. This group is characterized by the greatest weight and the shortest height, with the exception of Group IX, in which the height is the same.



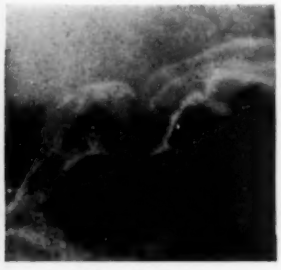
GROUP 3 GROUP 3 GROUP 5 GROUP 5

GROUP VIII, as cited above is similar to Group II, having thin, nearly perpendicular

posterior clinoid processes, with wide infundibular spaces; but this latter group, in addition, has small but distinct anterior processes. Three cases show double anterior clinoid processes with considerable variation in the rest of the sella. Two of these cases

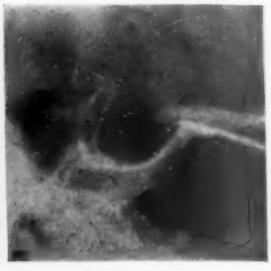


GROUP 6



GROUP 6

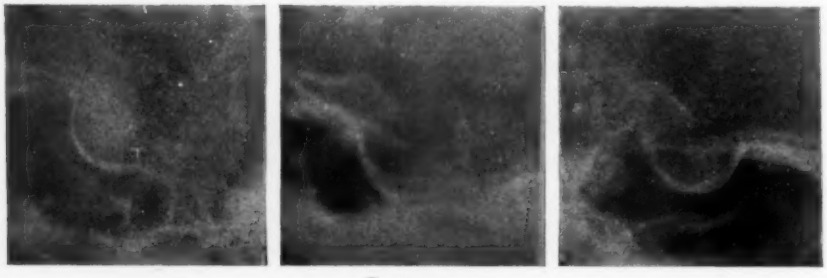
GROUP 7



GROUP 8

cesses. Like Group II it contains a large number of cases. The average weight is the lowest.

were repeated, thinking that position might play a part in the variation, but the same picture was observed. This group shows



GROUP 9

GROUP IX is composed of nine cases nearly all of which are different, and all of which show great variation. One case is very shallow, and shows complete absence of both next to the smallest longitudinal, and the smallest vertical cranial measurement.

The summary of the cases is shown in the following table:

TABLE SHOWING AVERAGE AGE, HEIGHT, WEIGHT AND MEASUREMENT OF THE SELLA TURCICA AND CRANIUM ARRANGED ACCORDING TO NINE CLASSES.

Class	Age	Height Inches	Weight Pounds	Sella Turcica Horizontal mm.	Sella Turcica Vertical mm.	Longitudinal mm.	Vertical mm.	Sex		No. of Cases
I	26	65	143	11	8.1	198	138	1 M	6 F	7
II	34	65	134	9.6	7.6	191	135	7 M	13 F	20
III	31	65	141	10.2	7.3	192	138	1 M	5 F	6
IV	36	67	161	10.6	7.5	193	139	4 M	3 F	7
V	45	65	151	9.9	7.	194	137	6 M	3 F	9
VI	26	65	134	9.	6.	189	142	3 M	7 F	10
VII	31	64	193	9.2	6.4	183	138	3 M	10 F	13
VIII	30	65	129	10.6	7.6	191	137	5 M	14 F	19
IX	36	64	131	9.5	6.2	190	134	2 M	7 F	9
Average	32	65	146	9.9	7.2	192	137	32 M	68 F	100

CONCLUSIONS

Results based on the study of one hundred normal cases would indicate that there is an extremely wide range of variation both in regard to size and structure of the sella turcica.

Absence of the anterior clinoid processes, or of both processes, is not necessarily of any pathological significance.

Group I, which showed the longest diameters of the sella, showed also the longest antero-posterior diameter of the head. The smallest heads occurred in this group, and it also showed the greatest variation in structure.

The small, bridged-over sella was found associated with the shortest antero-posterior diameter, and the longest vertical diameter of the cranium. There were a surprisingly large number of completely bridged over cases.

No definite relation between weight, height and age, and size or formation of the sella turcica was observed, except that Group VII showed the highest average age associated with very indistinct processes.

Unusual conditions of the sella should be closely correlated with other clinical data before coming to any conclusion.

Teleroentgenography combined with stereoscopic studies offers the best method of investigation.

THE LEUCOCYTIC BLOOD CONTENT OF THOSE HANDLING RADIUM FOR THERAPEUTIC PURPOSES

By J. C. MOTTRAN, M.B., and J. R. CLARKE

[From the *Proceedings of the Royal Society of Medicine*, London, Vol. XIII, No. 3, January, 1920. Abstract by L. S. Goin.]

This is a study of the effect of radium on the blood count of those employed in the Radium Institute of London. Two classes of workers were studied: (A) Laboratory workers who prepare and measure applicators containing emanation and radium; and (B) clinical workers who attach various screens to the applicators and apply them to patients. The leucocyte count of twenty of these individuals was compared with thirty-eight normal people. The polymorpho-nuclear and lymphocyte count is decidedly lower than normal. Eleven individuals had polymorpho-nuclear counts below the lowest normal, and three had lymphocyte counts well below normal. The lowest figures were 522 polymorpho-nuclear and 706 lymphocytes, the next lowest were 1035 polymorpho-nuclear and 855 lymphocyte. There was no evidence of a leucocytosis among the less irradiated workers, the highest count falling about the middle of the normal series. The leucopenia of radium workers manifests itself after a few weeks' exposure. A class A individual showed a drop from 7283 to 3077 polymorphs, and from 4544 to 1612 lymphocytes after one month. A class B worker showed a drop from 4448 to 2398 and 1824 to 1690 after two weeks. A two months' holiday was followed by a sharp rise in the cell count. The onset of the fall is rapid, recovery is slow. It is chiefly gamma rays which affect the worker.

The writers' experiments indicate that class B workers receive about 1.4 per cent of the total radiation received by a patient undergoing treatment for carcinoma of the breast.

UNUSUAL GASTRIC POLYP*

By HOWARD E. RUGGLES, M.D.

Asst. Clinical Professor of Roentgenology, University of California Medical School

SAN FRANCISCO, CALIF.

THERE is a small but growing literature on gastric polyposis, which testifies to its comparative rarity and the importance of the roentgen examination in its diagnosis.

Practically all of the case reports have dealt with the true polypoid form. Menetrier, in a thorough study of the subject in 1888,

FIG. 1. Prone Position.

called attention to a form of polyposis which he named "en nappe." It is a hyperplasia involving a localized area of the mucous membrane which is increased from two to five times its normal thickness, forming a large plaque of soft consistency. The growth is cut up by folds running in all directions. When palpated through the gastric wall, it gives the impression of a bundle of worms. The process is quite rare, only four cases having been reported since Menetrier's article.

Our case was a man of forty-eight complaining of fullness, gas, pressure in the upper epigastrium, belching, and constipation for the past eight months. There was never any severe pain. The sense of pressure was worse before meals and disappeared for an hour after eating, and he never vomited in spite of efforts to do so. He lost thirty pounds during this time. Physical examination was negative. Gastric analysis showed a low acidity. Blood was constantly present in the stomach contents and stools. There was a slight secondary anemia.

The roentgen examination showed a defect along the greater curvature, with a break in the gastric wall involving a quarter of its extent, giving the appearance of a somewhat lobulated mass. It was constant in all positions. Peristaltic waves did not pass through this area. There was no gastric residue at six hours, or other evidence of pathology in the gastrointestinal tract. Operation showed a mass in the middle third of the stomach of which the following is the pathologist's report:

"Specimen shows a tumor mass measuring about 10 x 11 cm. on the stomach mucosa. The surface shows close papillomatous growths resembling brain cortex which has been thrown into folds. In the gross there can be traced a gradual increase from the normal mucosa to the pronounced papillomatous outgrowths. No gross evidence of

FIG. 2. Mass Removed.

necrosis can be made out in any of the papillomata, although here and there can be found a slight amount of hemorrhage in the tips.

* Read before the PACIFIC COAST ROENTGEN RAY SOCIETY, December, 1917.

"Microscopical Pathology: Section shows a picture of stomach mucosa which displays a gradual increase from normal thickness to tremendous hypertrophy, taking upon itself a papillomatous formation. There is an enormous increase in number and length of gastric glands, which show a marked corkscrew type of growth and many branchings. Cells lining the glands are normal in appearance. In no place is there the slightest evidence of the stroma or musculature being invaded by epithelial cells. The basement membrane is everywhere intact and well preserved."

The case is of interest from its resemblance to carcinoma both clinically and roentgenologically.

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A WORD TO THE ROENTGEN THERAPEUTIST

BY C. AUGUSTUS SIMPSON

WASHINGTON, D. C.

I HOPE that those who have been and are using the roentgen rays for the treatment of hyperthyroidism are alive to the recent literature on the metabolic studies in this disease.

We have waited for years for a test that would show the actual improvement or lack of improvement in patients with Graves' disease following surgical and *x*-ray treatment. We have it now in the metabolism tests which have been perfected and popularized by pathologists and internists.

These tests show what I have been writing for the past six years, namely, that massive measured doses of *x*-rays over the thyroid and thymus glands at three week intervals will cure 90 per cent of the cases of hyperthyroidism and in the very great majority of instances render an operation unnecessary.

At last we have been able to demonstrate three things to which every roentgen therapeutist should be thoroughly alive and of which they should take immediate advantage:

1. That animal experiments show the *x*-ray will completely atrophy the thyroid as well as the thymus gland.

2. That raying of the thyroid gland does not complicate a future operation, but on the contrary serves to lessen the danger and risk to the patient.

3. That according to the metabolism tests carried out at the Massachusetts General Hospital, and other medical centers, the *x*-ray offers a very much better and decidedly less dangerous method of treating hyperthyroidism than surgery.

In comparing the two methods of treatment, not only was the raying without the danger of an operation and the results years later quite as good, but the patients who were treated by the roentgen ray to begin with were 27 per cent more toxic or dangerous than those operated on.

These results to my mind are a distinct victory and achievement for the *x*-rays, and obtained as they were by disinterested pathologists and internists, should show the profession at large what splendid results the

roentgen ray will give in Graves' disease. In a series of over one hundred cases, extending over a period of six years, I have had some failures, but also I have many who have been operated on, some as often as three times, with a return of the tumor and of all the symptoms.

I am quite sure the time will soon arrive when surgery will be considered only in the small percentage of cases of hyperthyroidism which fail to respond to the roentgen ray. As a matter of fact, a failure from *x*-ray will most often prognosticate an operative failure.

I can truthfully say that a physician makes a grave and deplorable mistake if he allows his patient to be operated on before getting massive doses of *x*-ray over the thyroid and thymus glands.

Give the patient an honest opinion as to the relative value of the roentgen ray and surgery, and that patient will invariably select the *x*-ray. Once they have had the *x*-rays properly administered, there will be very few instances where there is any need for an operation.

Now it is for every roentgen therapeutist to take an active interest in this splendid advance in theraphy, improve his technique, and see that patients are not exposed to a dangerous and disfiguring operation, when he has means at hand to prevent it.

I am satisfied that the three contradictory papers read in four years by a young roentgen therapeutist representing a great medical school and hospital, each paper and discussion expressing diametrically opposite views to its prior article on the above subject, must have been due to the influence of a surgical department over the *x*-ray department of his institution. At least I shall be charitable and say that he meant well.

In conclusion, let me say that if the roentgen therapeutist studies his patients, and carries out his technique accurately, he will not only obtain splendid results but he will actually save many lives and gain the undying thanks of scores of patients.

TWENTY-FIRST ANNUAL MEETING

FURTHER SUGGESTIONS ABOUT TRIP

TICKETING arrangements and railroad fares are essential items in connection with any trip, and especially so in connection with the journey to Rochester and Minneapolis for our Twenty-first Annual Meeting, September 14th to 17th, inclusive. The following information is, therefore, offered as first aid.

Do not fail to buy a round trip summer tourist excursion ticket, reading "via Chicago Great Western Railroad" between Chicago and Twin Cities. No other ticket to Twin Cities or beyond, and no other route, will permit of the stop-over at Rochester we have incorporated in our programme.

Summer tourist tickets are on sale to Twin Cities from almost all territory, the exceptions being the Trunk line and New England States, that is, the territory east of Buffalo and Salamanca, N. Y., Pittsburgh, Pa., and Wheeling, W. Va., and north of the Chesapeake & Ohio line.

From this portion of the country it will be necessary, in order to secure the stop-over privileges previously mentioned, to buy a summer tourist ticket to some destination beyond Twin Cities. From the New England territory, the first point beyond is Buffalo, Minn., only a short distance west of Minneapolis. From New York, Pennsylvania and the East, Sauk Center, Minn., is the nearest available destination, unless it is more convenient to purchase a one way ticket to Buffalo or Salamanca, N. Y., Pittsburgh, Pa., or Wheeling, W. Va., and from there buy round trip summer tourist excursion ticket to Twin Cities or beyond as outlined herein.

These ticket suggestions are addressed to those who must return home as quickly as possible, and it will be well to bear in mind that it is not necessary to use the ticket beyond Minneapolis when such tickets are purchased. To our other members, we again call to their attention the unusual opportunity that is offered to combine pleasure with business. Minneapolis is at the threshold of the truly wonderful Lake country of Minnesota. Within the area covered by St. Paul and Minneapolis are no less than thirteen lakes, and only a short car-ride away is beautiful Lake Minnetonka with its innumerable bays and inlets. But these are only a very few of the very many; a glance at that portion of the map of Minnesota lying north and northwest of Minneapolis will show lakes without number. These lakes abound in the fish that delight the angler—bass, pike, pickerel, and the mighty muskellunge. Hotel accommodations are excellent, an essential to the thorough and proper enjoyment of a vacation. Bathing, boating, golf and tennis furnish additional recreation, all calculated to further the complete enjoyment of the wonderful Minnesota atmosphere. We are indeed fortunate that our meeting affords this splendid opportunity to visit such a fine vacation country. There are numerous Minnesota points authorized as destinations for summer tourist excursion tickets, and if you will write Mr. A. C. Irons, General Passenger Agent, Chicago Great Western R. R., Chicago, Ill., advising him just what plans you are considering for your trip, he will gladly give you such information as will best meet with your requirements. Inquiry should be made early so that details may be arranged in time.

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TWENTY-FIRST ANNUAL MEETING

The Twenty-first Annual Meeting of THE AMERICAN ROENTGEN RAY SOCIETY will be held at Rochester, Minn., and Minneapolis, Minn., September 14, 15, 16 and 17, 1920; at Rochester on the 14th, at Minneapolis on the 15th, 16th and 17th. Further details concerning the meeting will appear in these columns from month to month.

Meeting and exhibits will be held in the CURTIS HOTEL, Minneapolis, which can accommodate about 300 members and guests. Reservations should be made early.

For information regarding railroads and method of travel, address Mr. A. C. Irons, General Passenger Agent, Chicago Great Western R. R., Chicago, Ill.

TWENTY-FIRST ANNUAL MEETING
PRELIMINARY PROGRAM

The Preliminary Program for the meeting of THE AMERICAN ROENTGEN RAY SOCIETY, Rochester, Minn., September 14, 1920, Minneapolis, September 15, 16 and 17, 1920, is as follows:

Tuesday, September 14, 1920

6:45 A. M. Arrive Rochester, via Chicago Great Western Railway.

7:00 A. M. Breakfast, Congregational Church, corner Second Street and Second Avenue, S. W.

8:00 A. M. to 12:00 noon. Surgical Clinics.

St. Mary's Hospital:

Operating Room 1.—Dr. C. H. Mayo.
Operating Room 2.—Dr. W. J. Mayo.
Operating Room 3.—Drs. E. S. Judd and V. C. Hunt.
Operating Room 4.—Drs. D. C. Balfour and J. C. Masson.
Operating Room 5.—Drs. W. E. Sistrunk and C. A. Hedblom.
Operating Room 6.—Drs. J. D. Pemberton and A. W. Adson.

Colonial Hospital:

Orthopedic surgery.—Drs. M. S. Henderson and H. W. Meyerding.
Thoracic surgery.—Dr. C. A. Hedblom.

Worrell Hospital:

Oral surgery.—Dr. G. B. New.
Surgery of Ear, Nose and Throat.—Drs. H. I. Lillie and R. A. Barlow.
Dental surgery.—Drs. B. S. Bardner and L. T. Austin.

The Doctors Mayo have promised that so far as possible, the surgical material for the clinics of September 14th will consist of cases of special interest to roentgenologists, the other classes of surgical cases being arranged for the day before or the day after.

9:00 A. M. to 11:00 A. M.

St. Mary's Hospital:

Pathological demonstration.—Dr. William C. MacCarty.

Demonstration of Gross Pathology.—Dr. H. E. Robertson.

Radium Hospital:

Radium and Roentgen Therapy Clinic.—Dr. H. H. Bowing.

The number of visitors in all clinics and demonstrations will necessarily be limited; allotments for the morning will be arranged immediately after breakfast.

12:00 to 1:00 P. M. Tour of the Mayo Clinic Building in small personally conducted parties.

1:00 P. M. Luncheon at Congregational Church.

2:00 P. M. Presentation of papers by the members of the Mayo Clinic Staff, Congregational Church, corner of Second Street and Second Avenue, S. W.

Dr. W. J. Mayo, Address of Welcome: *The Relation of Roentgenology to Surgery.*

Dr. M. S. Henderson: *Roentgenology in Bone Diseases.*

Dr. W. F. Braasch: *Pyeloroentgenography.*

Dr. R. D. Carman: *Roentgenology in the Mayo Clinic.*

Dr. W. C. MacCarty: *A Comparison of Roentgenologic Pathologic Findings in Gastrointestinal Lesions.*

Dr. H. H. Bowing: *Radiumtherapy in the Mayo Clinic.*

Dr. B. S. Gardner: *Roentgenology in Dental Diseases.*

Dr. L. B. Wilson: *Graduate Education in Roentgenology.*

5:00 P. M. Leave for Minneapolis by special train via Chicago Great Western Railway.

The following papers have been promised for the Minneapolis Program.

Dr. W. T. Bovie: *A Rational Basis for Sensitometry* (Read by Invitation).

Dr. F. W. O'Brien: *A Rational Method of Sensitometry.*

Dr. R. B. Wilsey: *The Influence of Scattered X-Rays in Radiography* (Read by Invitation).

Dr. A. W. Pirie: *A Retinometer, an Instrument for Measuring the Degree of Sensitiveness to Light of the Retina, to be Used in Connection with Fluoroscopy.*

Dr. W. D. Coolidge: *Physical Investigation Work in Progress on Tubes and Accessories.*

Dr. Walter C. Alvarez: *The Use of CO_2 in Producing Pneumoperitoneum* (Read by Invitation).

Dr. Albert F. Tyler: *Pneumoperitoneum as an Aid in the Differential Diagnosis of Diseases of the Left Half of the Abdomen.*

Dr. W. H. Stewart: *A Revised Estimate of the Value of Pneumoperitoneum.*

Dr. I. C. Rubin: *Pneumoperitoneum with Special Reference to Sterility and Allied Gynecological Conditions.*

Dr. L. T. LeWald: *Leather-Bottle Stomach: Report of a case together with its differential diagnosis from syphilis and carcinoma of the stomach.*

Dr. Lawrence Reynolds: *Some Observations of the Physiology of the Duodenum as Determined by the Fluoroscope* (Read by Invitation).

Dr. A. W. George: Title not announced.

Dr. G. E. Pfahler: *New Roentgenographic Technique for the Study of the Thyroid.*

Dr. Kennon Dunham: *A Review of X-Ray Chest Examinations.*

Dr. D. C. Jarvis: Title not announced.

Dr. W. W. Watkins: *Syphilitic-Tuberculous Symbiosis in the Lungs, reviewing the characteristics of each infection and of the double infection.*

Dr. R. J. Allison: Title not announced. (Read by Invitation.)

Dr. A. C. Christie: Paper on *Intrathoracic Neoplasms.*

Dr. E. H. Skinner: *The Collateral Treatment of Malignant Patients Undergoing Radiotherapy.*
Dr. Samuel Stern: Title not announced.
Dr. Isaac Levin: Title not announced. (Read by Invitation.)
Dr. R. H. Boggs: Title not announced.
Dr. John T. Murphy: *Calcified Cyst of Brain.*
Dr. Preston M. Hickey: *Paper on Mastoids.*
Dr. Hollis E. Potter: *The Use of the Bucky Diaphragm in Spine Examinations.*

As special guests of the Society, we will have, in addition to Dr. Bovie, Dr. Dallas B. Phemister of Chicago, *Studies on the Reduction of Bone Density,* Dr. Robert Knox of London, England, well known to all roentgenologists, Dr. Gonzales Martinez, of Paris and Porto Rico, who will present a paper on some phases of heart disease, and Dr. Walter C. Alvarez of the University of California, who will give the Caldwell Lecture on *Peristalsis in Health and Disease.*

Several other papers have been promised by Dr. Walter C. Hill who is now in Europe and will give a report on recent observations in Europe, and Dr. Leopold Jaches, who will give a sketch of the *x*-ray progress in Germany since the beginning of the Great War. Dr. Frederick M. Law will also exhibit a series of moving pictures.

It has been the intention of the Program Committee to omit no one who has new or important communications. Any one whose name does not appear in the above list who wishes to present a communication to the Society at this meeting will please address the President.

The local Entertainment Committee, consisting of Drs. C. D. Harrington, S. R. Maxeiner, C. A. Donaldson, R. R. Knight, Stanley Kerrick, Allison, F. S. Bissell, F. J. Souba, K. Ikeda, E. L. Gardener, S. Marx White and Charles A. Reed, have arranged an extensive plan for entertainment of the visiting members and guests. The present plan is to have Wednesday evening for lantern slide night, Thursday late afternoon and evening for an automobile ride, and a dinner dance at one of the country clubs; Friday night will be a banquet at the Hotel Curtis for which an interesting program has been provided.

Ample space has been provided for the Scientific Exhibit and all members are urged to bring with them material for this exhibit. Those contemplating presentation of plates should communicate with Dr. F. S. Bissell, Chairman of the Scientific Exhibit Committee, 801 La Salle Building, Minneapolis, Minnesota, as soon as possible, in order that ample provision may be made for exhibit racks.

Those wishing to demonstrate lantern slides will please communicate with the President, Dr. James T. Case, Sanitarium, Battle Creek, Michigan. Please give the number of slides it is desired to show and if possible, the topic covered. The program for the lantern slide night will be arranged for in order of application.

THE AMERICAN RADIUM SOCIETY
FIFTH ANNUAL MEETING

The Fifth Annual Meeting of THE AMERICAN RADIUM SOCIETY was held in New Orleans, La., April 26, 1920, Dr. Henry K. Pancoast presiding. The following program was presented:

Economic Problems of Radium Therapy. Dr. Albert Soiland, Los Angeles, Cal.

Radium in Toxic Goiter (read by title). Dr. W. H. B. Aikens, Toronto, Can.

The Absorption of Radium Radiation by the Tissues. Dr. G. Failla, New York City.

Report on the Intravenous Injection of the Active Deposit of Radium. Dr. Douglas Quick, New York City.

Symposium Upon Uterine Disease

The Treatment of Fibroids and the Metropathies by Radium. Dr. C. Jeff. Miller, New Orleans, La.

Review of 600 Cases of Menorrhagia and Uterine Myomas. Dr. Leda J. Stacy, Rochester, Minn.

Combined Radium and Roentgen Therapy of Uterine Cancer. Dr. E. H. Skinner, Kansas City, Mo.

The Classification of Uterine Cancer Cases for the Study of the Efficacy of Radium and Roentgen Therapy. Dr. Henry Schmitz, Chicago, Ill.

Discussion was opened by Dr. S. M. D. Clark, Dr. William Kohlmann, Dr. Walter A. Weed and Dr. Rudolph Matas.

Radium in the Treatment of Angiomata. Dr. William S. Newcomet, Philadelphia, Pa.

Discussion was opened by Dr. Ernest C. Samuel.

Symposium Upon the Use of Radium in Malignancy

Use of Emanation in the Treatment of Malignant Tumors (read by title). Dr. H. H. Janeway, New York City.

The Treatment of Recurrent and Metastatic Carcinoma of the Breast. Dr. Geo. E. Pfahler, Philadelphia, Pa.

Discussion was opened by Dr. T. C. Kennedy and Dr. R. E. Loucks.

A banquet was held in the evening when Dr. John M. Lee gave a demonstration. The following officers were elected:

President
Henry Schmitz, M.D., Chicago, Ill.

First Vice-President
Henry H. Janeway, M.D., New York

Second Vice-President
Leda J. Stacy, M.D., Rochester, Minn.

Treasurer
R. E. Loucks, M.D., Detroit, Mich.

Secretary
William S. Newcomet, M.D., Philadelphia, Pa.

Member of Executive Committee
Henry K. Pancoast, M.D., Philadelphia, Pa.

THE AMERICAN JOURNAL OF ROENTGENOLOGY was made the official organ of the Society.

CORRESPONDENCE

Shanghai General Hospital,
June 5th, 1920.

DR. EDWARD C. TITUS
127 West 11th St.
New York City

Dear Dr. Titus:

You told me to call on you if ever I needed help, so here I am. The Governors of the Hospital have instructed me to make inquiries as to the possibilities of securing an expert radiographer either from England or America, and I naturally turn to you to help us in this matter.

Dr. Macleod, who has been one of the leading doctors of Shanghai for well on to 50 years and who organized and has been in charge of our *X*-ray Department since its inception, has after many years of hard work for the Hospital given it all up and now acts only as Consultant. * * * The Governors have decided to take up the question of a really competent man to carry on this work.

There are some half dozen *x*-ray plants in Shanghai, but unfortunately there are none, since Dr. Macleod's resignation, which have an expert in charge. Under the wise and scientific direction of Dr. Macleod this Hospital has always been well in the vanguard as concerns this department, and as we have the best equipment it is our desire to secure a man who shall be able to carry on the splendid work done here hitherto. This means that we want a man who has had experience in all phases of *x*-ray work. He will be furnished with necessary assistants, but it is well that he knows the business from the ground up.

The entire time of the man in question would be at the disposal of the Governors of the Hospital, and as the *x*-ray work at present would not occupy him fully he would be expected to assume other professional duties, say electro-therapeutic or such other work as might be decided upon after his arrival.

It is usual that a five years' contract be entered into, to be terminated by either party on six months' notice. The man should be in

such physical condition as to enable him to pass as a first-class risk with a good insurance company. * * * We have no idea what a first-class man (and we want no other) would expect in the way of salary, so we will have to wait until we hear from you or him before making a definite offer. If in your answer you are able to give us information as to some one who is willing to come out, if we can meet his expectations as to salary, etc., it would be more satisfactory, as we could then close the matter by cable.

I trust I am not making too big a demand upon you and would like to assure you that anything you may be able to do for us will be greatly appreciated.

Yours sincerely,
(Signed) J. B. FEARN,
Secretary.

COMMUNICATION

From DR. MED. K. SECHER
Municipal Hospital
COPENHAGEN, DENMARK

To the Editor of THE AMERICAN JOURNAL OF ROENTGENOLOGY:

It is not necessary in this JOURNAL to point out the importance of roentgen therapy as applied to the treatment of exophthalmic goiter. Since the *x*-rays were introduced into the therapy of this disease in 1905, a series of roentgen treated cases have been published in all countries, and it is thus beyond doubt that this treatment of the disease in question is one of the most important—a view to which I can fully subscribe. It is, therefore, to say the least, unfair, when in discussing a paper of mine in this JOURNAL, 1919, page 49, Dr. H. K. Pancoast and Dr. Russell H. Boggs declare that I am opposing it, in that they only know my article from an evidently incomplete abstract, a fact which renders their criticism still less excusable.

Our knowledge of the effect of *x*-rays on the thyroid gland has not, however, increased very much during the years passed since 1905. In reality, we are on the same empiric basis now as at the introduction of this therapy. It is, therefore, quite unreasonable to declare that my work "loudly proclaims lack of knowledge of the physiological action of roentgen rays, especially as applied to the treatment of exophthalmic goiter."

In reality, the *x*-ray treatment of exophthalmic goiter is a subject still open to discussion, as it presents various problems which have not yet been solved and are claiming constant attention. As far as several other diseases are concerned, the effect of roentgen therapy is so well understood that the ncessary dose can now be stated exactly, but this is not the case with the thyroid gland and especially not with that pathological state which constitutes exophthalmic goiter. Complications may here always be met with on account of a too strong reaction on the part of the gland.

Roentgen treatment of the thyroid gland may cause a hypofunction of the organ, an effect which, however, seems to be of rare occurrence, and so shall not be dealt with here. But it may also give rise to a hyperfunction, a fact which renders difficult the estimation of a perhaps too strong dose, when the treatment is applied in a disease as exophthalmic goiter which itself depends upon a hyperfunction of the gland. On the other hand, the roentgen treatment has been used successfully in cases of severe hyperthyroidism (Simon, *Deutsche med. Wochenschrift*, 1911, p. 1345), which illustrates the difficulty of explaining the physiological effect of the treatment.

It is well known that the hyperthyroidism which immediately follows roentgen treatment is of common occurrence and—as may be seen from the literature—many authors reckon with it as a reaction which proves the efficacy of the rays.

Belot (*Strahlentherapie*, 1913, p. 561) states that the first few days after the treatment many patients, especially women, complain of indisposition, headache, diarrhea and vomiting, and therefore advises giving fractional doses. According to other authors

this does not seem to occur quite so constantly. Fischer (*Ugeskrift for Läger,* 1916, p. 1755) writes: "On the contrary, I have every now and then seen that patients who later on improved, felt worse after the first treatment, and I have ascribed this to the effects of an increased glandular secretion, the glands having as a rule at this point of time started to diminish in size."

Although the hyperthyroidism due to the roentgen treatment is of no special consequence in the great majority of cases, several authors report cases in which immediately following *x*-ray treatment serious conditions have occurred presenting the picture of a hyperthyroidism. This refers to the cases by Zimmern and Raymond, 1905, Stens-Hess, 1907, Faber, 1908, Kracke, 1909, Michailow, 1910, Stoney, 1912, and many others, and so to cases so recently observed that they cannot be attributed to a wrong technique.

It is on the base of these cases that those of Verning, Rieder, and that of this paper ought to be considered, in all of which death occurred after the roentgen treatment of exophthalmic goiter. The particulars of Rieder's case are, however, so imperfect that it is impossible to form a positive opinion of it. In Verning's and in my case the course of the disease cannot preclude the possibility that death was due to a hyperthyroidism caused by *x*-ray treatment.

The patient in Verning's case (*Hospitalstidende,* 1917, p. 731), was a woman aged twenty-six, who suffered from a severe Morbus Basedowii which remained unchanged during the first month of her stay at the hospital, loss of weight not noted. The pulse kept about 110-120. Her subjective feeling of heart-beat disappeared by and by during her stay at the hospital; the appetite was constantly bad. A month after her admission she had two roentgen treatments two days in succession, each of five hours, with filtered rays (3 mm. aluminum).

For the first three to four days after the treatment her condition remained unchanged, but later on the picture of a strong hyperthyroidism developed, which caused death two weeks after the *x*-ray treatments. Autopsy was not performed. (Verning furthermore has mentioned another case, in which, however, the casual relation seems more doubtful.)

In my case the patient was a woman aged forty, who had been suffering for a year, and was admitted to the hospital with an advanced Morbus Basedowii with the following symptoms: Exophthalmic goiter, Gräfe's, Möbius' and Stellwag's signs, and a considerable enlargement of the thyroid gland. Her heart was not enlarged, her pulse was about 100. A month after her admission she was subjected to *x*-ray treatment throughout a week. The treatment was supervised by the Roentgen Clinic (Chief: Professor Fischer). She had eight treatments à ½ Sabouraud-Noiré, with two mm. aluminum filters on four areas, three on the thyroid gland and one on the thymus. Already during the first treatment she became restless, confused, and had choreiform movements. Her restlessness increased, her pulse went to more than 200, respiration 72, until death occurred. At the autopsy the weight of the thyroid gland was found to be 145 gr., its width 9 cm. and its height 8 cm. No beginning degeneration was noted. The heart was not enlarged, it weighed 300 gr.

The criticism of Dr. Pancoast and Dr. Boggs is based upon ignorance of the nature of my case, otherwise they would not write: "It is most likely that Secher's cases were unrecognized exophthalmic types and not simple goiter." It decidedly was not simple goiter, but a typically developed case of exophthalmic goiter in which signs of a hyperthyroidism may be expected after roentgen treatment, a fact which my critics admit that roentgenologists acknowledge. It is the more unreasonable to believe my case to be only a simple goiter as, according to the unanimous opinion of roentgenologists, these cases are hardly ever fit for *x*-ray treatment, as usually they will remain unaffected by the rays. In some cases a simple

goiter has even developed into an exophthalmic goiter after the roentgen treatment (v. Decastello, L. Freund, Chwostek.)

In discussing the cause of death in Verning's case and in mine there are also two possibilities: The patient may *either* have died from a hyperthyroidism, caused directly by the roentgen treatment, *or* from a hyperthyroidism, due to a propagation of the disease itself, so that the *x*-ray treatment and the hyperthyroidism may only accidently have occurred at the same time. A definite solution of this question cannot be obtained on the basis of the material now placed before us. A mere supposition as to the causal relation between the roentgen treatment and the hyperthyroidism is all that can be expressed. This is what I have said, nothing else and nothing more. But acknowledging that symptoms of hyperthyroidism have occurred in several cases after roentgen treatment of exophthalmic goiter, and that serious conditions have developed in some cases, it is only a short step to admit the possibility that the *x*-rays may cause death in very roentgen-sensitive cases, even if the treatment be administered properly.

The lethal form of hyperthyroidism in exophthalmic goiter frequently presents the picture of a psychosis, which may be accompanied by restlessness, mania or melancholia. These conditions have been known since the first description of the disease, and were also mentioned by Basedow.

Both in Verning's and my case pronounced restlessness was observed before death occurred.

In the department for the insane of this hospital, patients suffering from exophthalmic goiter are treated every now and then, being removed to this ward on account of their psychosis-like condition.

Incidentally, just in the last few days two patients have died whose cases may throw some light upon the question under discussion.

One patient was a woman aged thirty-six, who had been suffering for two to three months from an incipient exophthalmic goiter with strongly pronounced exophthalmus, Möbius' sign, large struma, pulse 136. At the time of her admission to the hospital she was very restless, crying. She died four days after admission, with increasing restlessness and confusion. She had no roentgen treatment.

The other patient was a man aged thirty-five, who had been suffering for four months before his admission to Finsen's Clinic. His pulse was 150, he was very nervous, had tremor, enlargement of the thyroid gland, but no eye symptoms. A few days after his admission he had a roentgen treatment. The following day he became very restless and somewhat confused. He was removed to the department for the insane and died a few days later on, with increasing restlessness, confusion and pulse over 200.

We have thus two patients who died, both presenting the picture of the psychosis caused by hyperthyroidism. One of these patients had roentgen treatment, but only so small a dose (1 S.N. for thirteen minutes with 3 mm. filter) as to render the conclusion justified that the *x*-ray treatment itself cannot have caused death. If the patient had been subjected to a stronger dose, it might have been supposed that the treatment had been the direct cause of the lethal hyperthyroidism. There is, however, the difference between this case and those observed by Verning and myself, that the *psychosis-like condition* here sets in the day after the treatment, while in the two last-mentioned cases it began later on, namely at a point of time at which, on the whole, the reactive hyperthyroidism may be expected; and it is also at this point of time that the serious conditions have occurred in the cases mentioned above.

Both in Verning's and in my case, the patients had been subjected to roentgen doses strong enough to have influenced the gland. For this reason I feel entitled to express myself as I did before, and the last mentioned case illustrates the necessity of reservation towards the whole question. But these cases will distinctly reveal the problem still

open to discussion and claiming the attention of roentgenologists. We do not get any farther by avoiding the whole question, as did Dr. Pancoast and Dr. Boggs, and especially not by founding a criticism upon so insufficient a basis as was done by them in their discussion of my paper.

In conclusion I shall only draw attention to the warnings lately given as to the application of the very hard rays, which, according to experience, are able to give rise to such changes in the stomach and the intestines as may convey death. (H. E. Schmidt, *Fortschritte a.d. Gebiet. d. Röntgenstrählen,* Vol. 25, Part 4.)

K. SECHER.

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TRANSLATIONS & ABSTRACTS

COHN, ALFRED E., M.D. An Investigation of the Size of the Heart in Soldiers by the Teleroentgen Method. (*Arch. Int. Med.*, Vol. XXV, No. 5, May 15, 1920.)

It is not known with sufficient accuracy whether exertion, such as soldiers undergo in warfare, is accompanied by enlargement of the heart. The present study was undertaken to obtain information on this point. The examinations were made during May, 1919, of soldiers who had seen active service in the American Expeditionary Forces. Infantrymen were chosen, or men who had been subjected to an equivalent amount of privation and exertion. In this report are given the results of the study of the size of the heart only. Physical examinations were made and electrocardiograms were taken. The examinations now reported were roentgenographic. The exposures were made with sternum turned to, and parallel with, the plate. The distance from the anticathode of the roentgen ray tube to the photographic plate was 6 feet. A strip of lead about 1.0 cm. long, 6.0 mm. wide, and about 3.0 mm. thick was laid on the skin over the spines of the vertebrae and secured with adhesive plaster. Two acute angles of lead were similarly secured—one in the suprasternal notch and the other in the infrasternal notch. The target of the roentgen ray tube was adjusted to the level of the lower angle. Whether correct anteroposterior alignment was obtained, could then be ascertained by examining the plate. The exposures were made in the standing position. In making studies of this kind, Bardeen made the exposure "during deep but not forced inspiration and with two half second exposures with an intervening half second so as to insure a diastolic outline." The exposures were made by Smith during an inspiration of moderate depth after the subject had taken a deep breath and expired it. A method involving deeper breathing than normal has this purpose: it frees a larger portion of the cardiac shadow from the shadows of the surrounding viscera, especially the liver, and it permits the drawing of the outline of the cardiac shadow with greater ease. It is admitted that there is a disadvantage in the procedure; when the breath is held too long it occasions too great a filling of the heart, the photograph of which is, in consequence, larger than normal. A modification of the usual technic was, therefore, introduced in this study. No directions for breathing during the exposure were given; then men breathed normally. In order that the phase of respiration in which the plate was secured might be known, the following technic was devised. On the plate holder a lead strip was secured to indicate the neutral position of the vertically hanging lever of a Marey tambour with a lead ring. The tambour was connected by rubber tubing with a Politzer bag held in position in the right axilla by a binder secured by tying its tails; metal fastenings were, of course, avoided. During respiration, the lever swung to one or other side of the neutral line indicated by the lead strip. The side to which the lever swung during expiration was indicated on the plate holder by fastening there a lead letter E. The exposures were brief, a fraction of a second, perhaps as little as one-tenth second on occasion, so that the image of the lead ring of the lever was sharp. When the exposure was longer, or the breathing faster, the trail of the lever, as it swung across the plate, appeared on the plate and showed this fact. The lever of the tambour was in view of the operator, so that by observing it the exposure could be made in any phase of breathing. The desired information was, accordingly, recorded on the plate. The attempt was made to secure the exposures during normal inspiration. This succeeded in 140 of 161 instances. But to study the effect of normal breathing on the size of the heart, the heart in 56 instances was photographed both in inspiration and in expiration. Note should be taken of the fact that in many persons expiration is not an active process, but is the release from inspiration. In these cases, the expiratory phase is represented by the neutral position. There is, however, a defect in this method. It is impossible to record on the plate the exact level of the respiratory phase at which the exposure was made. The method is subjective to the extent that to secure the photograph at the height of the respiratory phases, reliance is placed on the operator. The measurements taken were those recommended by Moritz and his followers. In the plates the right and left borders were traced, and the

outline of the heart's shadow completed by joining arbitrarily the lines representing these. The long and transverse diameters were measured. The angle of inclination of the heart, that is to say, the angle formed by the long diameter and a line drawn to the cardiac apex at right angles with the median line, was recorded. The area of the cardiac outline was measured by the planimeter. In measuring 56 pairs of roentgenograms it was found that in inspiration and in expiration the transverse diameter was identical in 6 pairs, greater in inspiration in 31 pairs and smaller in 19 pairs. The long diameters were identical in 3 pairs, greater in inspiration in 42 pairs, and smaller in 11 pairs. The area was greater in inspiration in 44 pairs, smaller in 12 pairs. The angle of inclination was identical in 3 pairs, greater in inspiration in 39 pairs, and smaller in 14 pairs. But the difference in size and the difference in position was not great. The comparison of roentgenograms made in normal inspiration and expiration then, permits the statement that the difference between the two is not great; that, as is expected, the size of the heart shadow is usually greater in inspiration; and that, in this phase, the angle of inclination is usually larger. For clinical purposes, therefore, as will be shown, in a method accompanied by variations so large, the influence of the phases of normal respiration on the size of the heart may be neglected.

CONCLUSIONS

1. In normal breathing the difference in the size of the heart during inspiration and expiration may be neglected.

2. The use of the transverse diameter of the heart shadow is a satisfactory measurement. It is as useful as and less uncertain than the long diameter of the area.

3. The range of the observed measurements interferes with the usefulness of the clinic of standard and average curves.

4. The hearts of soldiers examined under conditions stated are not larger than those of normal individuals.

W. W. BELDEN.

BRAZSCH, W. F., M.D., and CARMAN, R. D., M.D., Rochester, Minn. Renal Fluoroscopy at the Operating Table. (*J. Am. M. Assn.*, Vol. 73, No. 23, December 6, 1919.)

The apparatus used for making fluoroscopic observations of the kidney at the operating table is essentially the same as that used in the base and field hospitals of the army, but with certain minor changes which make it adaptable to civilian practice. Such instruments (machines) consist of a transformer and autotransformer enclosed in a metal cabinet mounted on large casters for portability. To the cabinet is attached a tube stand with a horizontal arm having universal joints for supporting the tube. The tube is of the Coolidge radiator self-rectifying type, mounted in a lead glass shield. The unit is small and compact, requiring less than 2½ square feet of floor space. It is of light weight, is portable, and has no moving parts which might cause noise and vibration. The current is turned on and off either by a hand or a floor switch. These portable units may be operated from the ordinary lamp socket without special wiring.

Technic. As an essential preliminary, the roentgen ray operator should wear goggles of smoked glass for about fifteen minutes before the observation is to be made in order that he may have the necessary dark-accommodation and retinal perception. The roentgen ray unit should be placed as close to the operating table as possible, and the rays focused through a small diaphragm so that they will pass through the delivered kidney on the fluoroscopic screen. When the fluoroscopist is ready to make the roentgenoscopic examination, the hooded screen held in the left hand is placed over the eyes, and the goggles are removed. The current is turned on by means of a foot switch. In the right hand is held a sterilized metal-tipped rod 18 inches long with which the fluoroscopist accurately points to the stone shadow in the kidney. The exposure is short, requiring little more than a flash. The various details can be arranged so that there is no interference with surgical asepsis.

RIGGS, THEODORE F., M.D., Pierre, S. D. Diaphragmatic Hernia. (*Ann. Surg.*, Vol. LXXI, No. 3.)

Protrusion of a portion of the abdominal viscera through an opening in the diaphragm,

while by no means unknown, is perhaps more frequent than we realize. According to Giffin, about 650 cases of diaphragmatic hernia had been reported in the literature up to 1912, and eighteen articles on this subject, from the point of view of the radiologist or surgeon, have appeared during the past two years. Since many of the diagnoses have been made only in the autopsy room, and as a number of patients have been operated upon with the hernia unrecognized and unrelieved, it is probable, as Soresi so clearly points out, that many a person is in discomfort to-day because of the failure to recognize the true condition present.

According to the authorities the great majority of diaphragmatic herniae occur to the left of the midline. The case herein reported they believe to have been a true traumatic hernia on the right of the midline.

That the hernia was of traumatic origin they believe. That the opening was to the right of the midline they are certain. That the condition was not an elevation or relaxation of the diaphragm is proved by the definite limits of the opening. That the rupture was not through one of the normal openings in the diaphragm was shown by its position and the fact that no tissues passed through the ring other than the transverse colon and stomach.

Of the presence of a hernial sac or membrane they are sure, although they cannot be certain it was not a false sac developed by the longstanding hernia. However, because the hernia evidently did not reach its maximum size at onset, because there were no adhesions of the viscera in the sac, and because the pillars of the split in the diaphragm were so evidently covered with peritoneum, they feel justified in believing the hernia to have been a true one, namely, contained in a sac formed by the diaphragmatic peritoneum and the diaphragmatic pleura.

If it be true, as seems likely, that the profession is not making as high a percentage of correct diagnoses in diaphragmatic hernia as in other more frequent abdominal conditions, the failure is probably due to lack of a sufficiently definite symptomatology. DeCourcy has formulated a few symptoms which point to non-traumatic cases of diaphragmatic hernia. Soresi discusses fully the difficulties of outlining the symptoms characteristic of small diaphragmatic hernias which he says are never diagnosed, and he urges careful routine examination of the diaphragm. A comparison of the cases reported by Beckman, Giffin, DeCourcy, and others brings out clearly the variations in, and the multiplicity of, the symptoms.

This is to be expected when one considers the many combinations possible, depending upon the location of the hilus and the viscera involved. It is reasonable to expect the traumatic hernia to be more easily diagnosed than the non-traumatic form, but one must remember that the severity of the symptoms is not necessarily in keeping with the size of the hernia. The possibility of a diaphragmatic hernia should, perhaps, be the more often considered.

W. W. Belden.